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Financial development and comparative advantage: the effect of financial development on manufacturing export in Africa

Développement financier et avantage comparatif : l'effet du développement financier sur les exportations manufacturières en Afrique

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Abstract

The aim of this paper is to assess the effect of financial development on manufacturing export in Africa in 30 countries from 2000 to 2021, accounting for endogeneity of variables using a new novel xtdpdgmm command that implements two-step system GMM (Generalised Method of Moment) estimators. According to the empirical results, financial development significantly influences the manufactured export having a negative sign and pointing out that financial sector development lowers African manufacturing export. Designing policy frameworks that encourage export, promote industrial development, and create better environment for long-term sustainable growth should redirect the financial sector so that that sector is veritable mean to shift economic structure toward manufacturing development.

Keywords: Financial development; comparative advantage; system GMM; manufacturing exports; industrialization.

Résumé

L'objectif de cet article est d'estimer l'effet du développement financier sur les exportations manufacturières dans 30 en Afrique de 2000 à 2021, en tenant compte de l'endogénéité des variables à l'aide d'une nouvelle commande *xtdpdgmm* qui met en œuvre un estimateur GMM (Méthode Généralisée des Moments) en deux étapes. Selon les résultats empiriques, le développement financier influence de manière significative les exportations de produits manufacturés, avec un signe négatif, ce qui indique que le développement du secteur financier réduit les exportations de produits manufacturés africains. La conception de cadres politiques qui encouragent l'exportation, promeuvent le développement industriel et créent un meilleur environnement pour une croissance durable à long terme devrait réorienter le secteur financier de sorte que ce secteur soit un véritable moyen de faire évoluer la structure économique vers le développement manufacturier.

Mots clés : Développement financier ; avantage comparatif ; système GMM en deux étapes ; exportation manufacturière ; industrialisation.

Introduction

Does financial development affect comparative advantage in international trade? This paper provides empirical evidence on the role played by financial sector in shaping comparative advantage in Africa. Understanding of whether financial development affects the trade's patterns remains an open area of research and the quest of quantitative assessment is necessary for both academicians and policy makers.

Economists for long time studied factors that shape the pattern of trade in goods between two countries basing on the difference in factor endowments and difference in technologies. The Heckscher-Ohlin-Samuelson (hereafter HOS) theory showed that each country specialises in good for which it has a comparative advantage and becomes net exporter for this good. Comparative advantage comes from factor endowments such as labour, capital, land.[1] This implies that developing countries that are well endowed in labour and land should specialise in primary goods and low value-added labour-intensive products. Vanek (1965) provided an extension of this model basing on multi-good, multi-factor model and on factor content.[2]

In recent decades, East Asian countries have moved from net importer to net exporter of manufacturing goods. China is now the largest exporter in the world basing its strategy in manufacturing sector development. China and other East Asia countries have thus changed composition of their tradable goods over time and are become more competitive in international market.

In contrast, African countries have made little progress in that direction. They continue to export low value-added commodities based mainly on fuel, gas, and other primary commodities. In the same time, they are net importer of manufacturing goods such as television, car, mobile phone, clothes, and so on. This situation causes negative impact on the balance of payment and employment.

The need to upgrade their natural resources and develop a new comparative advantage, especially in medium and high tech goods is among countries' priorities insofar as manufacturing export are more likely to play that role, generating positive spillover such as innovation and accumulation of physical and human capital, and linkage for development (Hausmann, Hwang and Rodrik, 2007). Fosu (1990) shown evidences of dynamic effect from

[1] In Ricardian model, technology differences provide such comparative advantage and leads to different pattern of specialisation.

[2] "Factor content" of trade represent amounts of labour, capital, land, etc. embodied in the exports and import of a country. In a world of two commodities (X and Y) and two factors (labour and capital), we say that commodity Y is capital intensive if the capital-labour ratio (K/L) used in the production of Y is greater than K/L used in the production of X.

manufactured exports. [3] Focusing on the low export performance of African countries, Iwanow & Kirkpatrick (2009) show that liberalizing trade is not sufficient to achieve high export performance. Historically and empirically, countries that have improved their competitiveness are those that have established sound manufacturing sectors.

Manufacturing industries depend more heavily on external finance for investment financing. The lack of adequate financial system in developing countries causes a comparative disadvantage in that sector (Demir and Dahi, 2011). Moreover, export activity generates a number of costs namely, transports, transaction and marketing costs. When export costs are high, firms need external finance to participate in international market.

The relationship between financial system and comparative advantage date back to the work of Kletzer & Bardhan (1987), which recognised the importance of credit market in shaping pattern of specialisation. Kletzer & Bardhan (1987) show that differences between countries in the domestic institutions of credit contract enforcement may lead to difference in comparative advantage in producing processed or sophisticated manufactured goods. Afterward, a number of studies have been undertaken in that direction (Beck, 2002, Crinò & Ogliari, 2017; Do & Levchenko, 2007; Levchenko, 2007; Manova, 2013). Yet, few studies have been conducted on Africa. As a result, the current paper attempts to fill this gap by providing empirical evidence based on African countries.

Differences in financial performance amongst African countries raise the question whether such difference in financial development can explain differences in pattern of trade in Africa. In such a context, the question this paper attempts to analyse is following: What is the role of financial development in comparative advantage? Specifically, to what extent recent financial development in Africa influences its manufacturing exports?

For this purpose, we estimate the effect of financial development on manufacturing export, as we expect that well-developed financial system provide comparative advantage in manufacturing goods.

For many African economies, demand conditions and access to developed economies' markets for manufactures have become more important in determining their export earnings than has demand for their primary goods. In addition, the structure of trade can be critical to long-term growth. Hausmann, Hwang and Rodrik (2007) show that the specialization patterns of otherwise similar countries can result in differences in economic development. Mazumdar

[3] However, Bradford (1994) pointed out that export might be the result rather than the cause of rapid growth.

(1996) posits that the composition of trade is a major determinant of the strength of the 'engine of growth. In the case of Africa, as argued in Baliamoune-Lutz and Ndikumana (2007), this implies that "the recent export boom which is driven by capital-intensive sectors such as oil is not likely to generate growth that is sustainable, especially because of the low gains in employment creation and limited spillover effects on non-oil sectors."

In such a context, our main contribution is to provide empirical evidence to guide policy makers in the use of financial system to shape comparative advantage. Beyond traditional trade theory, this study analyses empirically whether the observed variation in the level of financial development determines pattern of specialisation, that is, whether we have to consider financial sector as factor of production, hence as catalyst to export competitiveness in the sense that manufacturing exports dominate world trade. Secondly, this paper can provide a guide to design trade policy by strongly advocate for financial reform as long as financial development provide comparative advantage in higher productive sector, namely, industrial sector.

In the current paper, we used the $xtdpdgmm$ command introduced by Kripfganz (2019) for system GMM estimation with the non-linear moment conditions of Ahn and Schmidt (1995). Our findings, beyond our expectation, suggest that increases in financial development may be detrimental for African 'development in manufacturing export. This may be due to the misallocation arising because financial institutions prioritise lending to sectors with higher perceived return or lower risk, which can crowd out credit to manufacturing sectors.

The rest of this paper is organized as follows. In section 1, we provide literature review. In section 2, we specify our theoretical framework, and then we describe our econometrical procedure in section 3. In section 4, we discuss result estimations.

1. Revue of literature

The role of financial development in shaping and enhancing comparative advantage dates back to Kletzer & Bardhan (1987). In their seminal work, Kletzer & Bardhan (1987) show that even when technology and endowments are identical between countries and economies of scale are absent, institutional features of the credit market can affect the pattern of specialisation. Moral hazard considerations in the international credit market under sovereign risk and differences between countries the domestic institutions of credit contract enforcement under incomplete information may lead to one country facing a higher interest rate or rationed credit compared to another. In such situations, the former country (usually the poorer one) may face a comparative disadvantage in producing processed or sophisticated manufactured goods requiring more working capital or credit to cover selling or distribution costs in comparison to

bulk primary products. This model exemplifies how comparative advantage explicitly depends, unlike in standard trade theory, on difference in financial institution. Thus, financial sector is perceived as a factor endowment.

Using Credit rationing model like Kletzer & Bardhan (1987) in which credit rationing is result of asymmetric information between firms engaged in R&D activities and lenders, Qui (1999) finds that the patterns of trade are largely indeterminate and they are not determined by comparative advantage or increasing return to scale. He bases its analysis on the role of credit rationing for patterns of international trade in newly invented product and explains factor of indeterminacy by the fact that Research and Development of product innovation is costly, and that it can never be assured that R&D would always bring new products. This study suggests that obtaining funds become a necessary condition for countries to become exporter of new products but not the sufficient condition. According to this model two countries may be exporters to each other, new product can be exported by one country, or neither country produce the product in that case, there is no trade.

When financial sector that allocates capital and risk appropriately in the economy, becomes an important catalyst of economy growth, it allows country to participate in international market. Baldwin (1989) focuses on the risk-diversification function of a financial market. Analysing two sectors of economy in which sectors differ according to the demand shock, he shows that economies with better-developed financial markets are better able to diversify risk because they have better diversification possibilities. Accordingly, countries with well-developed financial system specialise in producing the risky good with relatively lower risk premium. Amiti and Weistein (2011) that argue that exports are more sensitive to financial shocks due to higher default risk and higher working capital requirement associate with international trade confirm this. Based on Japanese' industries they show that health of financial institutions is an important determinant of firm-level export during crises.

Financial development allows overcoming economies of scale constraints. Sectors with increasing return to scale due for example to fixed costs are more likely to depend on external financial resources, hence, they should be the first beneficial from financial development. Beck (2002) shows that trade patterns depend on differences in financing development even when both sectors rely on external financing. In his model, one of the two sectors (the manufacturing sector) exploits increasing returns to scale while the other (the food sector) is characterized by constant returns to scale. Moreover, savers are assumed to face search costs when attempting to channel their funds to investors. A well-developed financial system makes it possible to

mitigate search costs and to allocate a larger share of funds to productive activities. As the manufacturing sector exploits increasing returns to scale, it profits from a large volume of external financing largely than the food sector. Consequently, a relatively high level of financial development is associated with exporting manufacturing-goods while a relatively low level of financial development is associated with exporting food goods.

Furthermore, Beck (2003) tests the hypothesis derived from Kletzer and Bardhan (1987), and their own work by exploring the impact that financial development has on the structure of the trade balance, specifically, on the export share and trade balance in manufactures. Using a sample of 65 over 35 year and applying GMM estimator in dynamic panel, he shows that financial development, measured by credit to the private sector by deposit money banks and other financial intermediaries as share of GDP, has a significant positive impact on the ratio of manufactured exports to GDP, the ratio of manufactured exports to total exports and the trade balance ratio of manufactured goods to GDP. Likewise, analysing data on 56 countries between 1980 and 1989 and using two other proxies for financial development inspired by the literature on "growth and finance", namely the ratio of market capitalization to GDP and the overall size of financial development, defined as the sum of credit to private sector and ratio of market capitalisation to GDP, Beck (2003) finds that the financial development proxies have a significant and positive effect on industry-level export.

Recently, Qun and Jiayu (2007) using Heckscher-Ohlin hypotheses in adding the financial system demonstrate how financial development affect manufacturing export. In order to investigate the effect of financial development, they analyse how financial development will affect the price and factor input of manufactured goods production. Considering two sectors in the economy, namely, primary and manufacture, they assume that manufacture production depends on external finance. This is possible because of the presence of intermediate sector whose production usually requires certain costs. According to them, a well-developed financial market increases both capital-intensity and output in manufactured goods sector. Testing such proposition on China province data, Qun and Jiayu (2007) showed that financial development raises the amount of export, using the white cross-section method.

At the more disaggregate level Svaleryd & Vlachos (2005) analysing empirically how financial markets shape industry specialisation patterns and international competitiveness find a strong causal effect of the financial sector on industrial specialisation. Based on 32 manufacturing industries in 20 OECD countries and using different measures of financial development, their results suggest that financial development is a source of comparative advantage. Another

conclusion drawn from Svaleryd & Vlachos (2005) is that, the impact of financial system on the pattern of specialisation is very large compared to other factor endowments, for example, human capital. Looking at specific indicators of financial development, they show that well-developed stock market is an important source of competitive advantage among financially dependent industries. The liquid liabilities ratio seems to be of no importance for industrial specialisation and is not even close to statically significance. The impact of private credit is statically significant. That is, a country relatively well endowed with well-functioning financial institutions should thus tend to specialise in sector relatively intensive in the use of the services provided by these institutions. They treat financial market and intermediaries as factors in the production of goods and services. A necessary condition for a production factor to give rise to comparative advantage is that it is immobile across countries.

The literature also provides micro-level analysis concerning the relationship between financial constraint and export performance. Looking at the firm level, economists show the impact of financial development on firm decision and capacity to export. Micro-level literature enriches the analysis of the relationship between financial development and trade by examining how the notion of external financial dependence can be introduced into trade models with heterogeneous firms. This literature is usually known as "new trade theory", in the line of the Melitz's (2003) model.

According to this approach, firms differ in their productivity, which when trade is opened leads to a selection effect, only firms with a sufficient level of productivity export. Firms with different productivity levels coexist in an industry because each firm faces initial uncertainty concerning its productivity before making an irreversible investment to enter the industry. Financial frictions are introduced by assuming that exporters face specific costs. On the one hand, exporting induces upfront costs, due to advertising, gathering information on foreign customers, administrative procedures, translation, organizing foreign distribution networks etc. On the other hand, exporting firms face variable transport costs, which depend on shipping time and export volume. As fixed and variable costs must be externally financed, exporting activities crucially depend on the intensity of firms' financial constraints. While the financing available for sunk fixed costs determines firms' export decisions, that is, extensive margins of trade, the financing available for variable costs affects the level of firm exports, that is, the intensive margins of trade.

In a seminal work, Melitz (2003) show that the most efficient firms earn and export extra products abroad. Less efficient firms can only serve the domestic market since the entry to the

foreign market would generate losses. Inspired by Melitz (2003), Chaney (2005) first introduced liquidity constraints into the heterogeneous firms model and predicted that firms with higher liquidity endowment would face fewer financial constraints, and it would consequently be easier for such firms to enter the export market. Manova (2008) took a step forward to consider financial contracts and asset tangibility in a framework of firm heterogeneity. He develops a model with several countries at different levels of financial development, heterogeneous firms and sectors differentiated by their financial dependence. He also provides evidence that credit constraints are an important determinant of international trade flows, exploiting shocks to the availability of external finance and examining the impact of equity market liberalizations on the export behaviour of 91 countries over the period 1980-1997. His findings show that liberalizations increase exports disproportionately more in financially vulnerable sectors that require more outside finance. More interesting, he highlights that result is not driven by cross-country differences in factor endowments and is independent of simultaneous trade policy reforms. He also shows that the effects of liberalizations are more pronounced in economies with initially less active stock markets, indicating that foreign equity flows may substitute for an underdeveloped domestic financial system.

On the other hand, Manova (2013) shows financial market imperfections severely restrict international trade flows because exporters require external capital. In his paper, he explicitly Investigate the structure of financial contracts between firms and funders. He also considers heterogeneity not only across firms but also across sectors. Doing so, he identifies and quantifies the three mechanisms through which credit constraints affect trade: the selection of heterogeneous firms into domestic production, the selection of domestic manufacturers into exporting, and the level of firm exports. Overall, his results show financially development economies export more in financially vulnerable sectors because they enter more markets, ship more products to each destination, and sell more of each product. These results have important policy implications for less developed nations that rely on exports for economic growth but suffer from weak financial institutions.

Other authors confirm this finding. For example, Mulls (2008) shows that credit constraint really do matter for export patterns. Combining both liquidity endowments and external financial contracts into a general equilibrium model, Mulls (2008) finds that the credit rating, the Coface score from a credit insuring company, has significant effects on a firm's exports. Mulls' theoretical model assumes equal cost of external finance following Manova (2008). That is, the repayment required for an identical principal is the same across all firms. For Bernand

and Hiericout (2010) financial factor affects both the firm' export decision and the amount exported by firms.

Besedeš, Kim, & Lugovskyy (2014) refine Manova (2013) findings by considering that the intensity of financial constraint depends on whether the firm is a new exporter or not. They employ a dynamic model in which the perceived risk of firms decreases with export duration and use product level data on exports to 12 European Union members and the United States. They also show that the harmful effect of financial vulnerability on export growth is weaker for firms that have been exporting for a long time. Kohn et al. (2012), basing on the same dynamic approach, find that firms' export behaviour is subject to some hysteresis: firms that successfully exported in the past are more likely to export in the future

2. Theoretical framework

Financial system may affect trade pattern through different channels. In this section, we provide a simple theoretical model in which we can grasp the effects of difference of financial development on international trade.

We use model of Qun and Jiayu (2007) in which we can draw conclusion for both static and dynamic effect of financial development on the pattern of specialisation. Financial development is modelled as lowering the search costs and thus increasing the level of external finance in the economy. Their empirical test builds on the assumption that the production of manufactured goods exhibits higher economy of scales than the production of agricultural goods or the provision of services. In order to shed light factor endowment – in our case financial development – as a source comparative advantage, we assume that: (i) production function is identical around the region and (ii) household have identical taste and homothetic preference around the region.

We consider countries can produce two kinds of goods: manufactured good (M) and primary good (A) and as mention above countries share the same utility function assuming Cobb-Douglas function:

$$U = A^{\rho} M^{1-\rho} \tag{1}$$

Where A is the consumption of primary goods, (A denotes agriculture, fishing, mining for mention a few); M the consumption of manufactured goods and ρ the elasticity of substitution between these two goods, in order words, ρ measures the preference of consumer towards primary goods. Note that because countries share the same utility function, we remove sub-script to identify countries.

We also assume that countries produce two goods using different technologies. Primary goods are produced using only one factor of production, labour, and manufactured goods are produced using both labour and capital[4]. Formerly, we can write the production functions as follows:

$$A = \beta L_A \tag{2}$$

$$M = \lambda L_M^{\alpha} K^{1-\alpha} \tag{3}$$

Where β meausres the labour productivity in primary goods sector and L_A is labour used in primary sector. In the production function of manufactured goods, λ represents productivity in manufactured goods sector. K represents the amount of physical capital used, and L_M denotes the labour employed in manufacturing sector.

We suppose that labour is endowment and available in fixed quantity, we can summarize it by this equation:

$$\bar{L} = L_A + L_M \tag{4}$$

We assume that physical capital used in manufactured goods sector is produced from intermediate goods. Following Grossman and Helpman (1991), Qun and Jiayu (2007) adopt the following specification:

$$K = \left[\int_0^N x(j)^{1-\alpha}\, dj\right]^{1/1-\alpha} \tag{5}$$

Where $x(j)$ denotes the quantity of the j intermediate goods in manufactured goods sector.

A representative consumer maximises its utility subject to its budget constraint. By assuming a competitive market in which prices are given. The consumer solves the programme below:

Max $U = A^{\rho} M^{1-\rho}$

s.t $I = P_A.A + P_M.M$ (6)

I denote Income or consumption expenditure. P_A and P_M are the prices of primary goods and manufactured goods, respectively. In equilibrium we have

$\rho I = P_A.A$ Optimal expenditure on primary goods and

$(1-\rho)I = P_M.M$ Optimal expenditure on manufactured goods

Let us take the price of primary goods as a numeraire, that is, $P_A = 1$. The relative expenditure on two goods is constant

$$\frac{P_M.M}{P_A.A} = \frac{P_M}{A} = \frac{1-\rho}{\rho} \tag{7}$$

P_M is now the relative price of manufactured goods.

[4] This assumption is widely used to construct a theoretical framework. For example, in Matsuyama (1992), agricultural production depends on one input, labour.

On the firm' side we assume that the price of intermediate good j, $P_x(j)$ is given. Firm maximise their profit by choosing the amount of intermediate good. More specifically firm' programme is as follow:

Max $P_M.M - \int_0^N P_x(j).x(j)dj$

The inverse demand function of intermediate goods is

$$P_x(j) = P_M\lambda(1-\alpha)x^{-\alpha} \quad (8)$$

From equation (5) we must derive the following implication:

$\frac{dx(j)}{dP_x(j)} < 0$, that is, as $P_x(x)$ increases the demand of intermediate goods decrease. Intermediate goods are provided by intermediate goods sectors and their production usually require certain costs. For instance, invention of new intermediate goods needs certain initial investment (King and Levine, 1993).

If we assume that firms having intermediate goods conduct R&D activity by themselves, they have to finance their R&D expenditure. In addition, If the new production technology is purchased or licensed from R&D institutions, then the sector producing intermediate goods has to pay a certain patent holder. Subsequently, some external financing is required to support the firms' own R&D activity or patent purchases, and firms vary in their access to external finance so that the effective production cost they face is higher for some firms than for others. In our context, we may view that the dependence on external finance to produce manufactured goods differ substantially from primary sector. Since labour is the only factor of production in primary sector, financial development does not affect production of primary goods. Let us assume that the financial cost of one-unit intermediate goods is ϕ, and then profit maximisation of intermediate goods sector will be

Max $P_x(j).x(j) - \phi x(j)$ (9)

The value of ϕ is closely related to the degree of financial development. In country with well financial development, firms producing intermediate goods can finance themselves with lower cost (smallerϕ) and hence their production cost is is less than other sectors. Combining with equation (5) profit maximisation becomes

$P_M\lambda(1-\alpha)x(j)^{1-\alpha} - \phi x(j)$

From profit maximisation, we get price of intermediate good j, namely

$$P_x(j) = \frac{\phi}{1-\alpha} \quad (10)$$

Note that since $0< \alpha < 1$, then we have $P_x > \phi$

Using profit equation above the demand of intermediate goods for manufactured goods producer is

$x = \left[\frac{P_M \lambda (1-\alpha)^2}{\phi}\right]^{\frac{1}{\alpha}}$ or $x = \left[\frac{P_M \Omega}{\phi}\right]^{\frac{1}{\alpha}}$ where $\Omega = \lambda(1-\alpha)^2$

In addition, the output of manufactured goods will be

$$M = \lambda N L_M \left(\frac{P_M \Omega}{\phi}\right)^{\frac{1-\alpha}{\alpha}} \quad (11)$$

Now we can derive the following implication:

$\frac{dM}{dP_M} > 0$, that is, if P_M increases, then manufactured output will also be higher;

$\frac{dM}{d\phi} < 0$, that is, if financial market is well developed, in other words, the financing cost of manufactured production will be lower, then its output will increase;

$\frac{dM}{dL_M} > 0$, this implies that a larger share of labour input in manufactured goods sector will also increase its output.

3. Empirical specification and Estimation strategy

3.1. Empirical specification

Our specification aims to test proposition brought by the theoretical framework in which other things being equal, a high level of financial development causes an increase in export share of manufactured goods. In other words, we test whether financial development brings about comparative advantage in manufacturing sector. In this line, financial system is considered as factor endowment. However, it is important to note that we have supposed that financial development increase credit to enterprises, which invest in export activities. It is also possible, although we have not modelled, that credit to household enlarge demand of manufactured goods, thus rendering manufacturing production profitable. This may be called the demand effect. Our econometric model can be specified as follows:

$$maexp_{it} = \alpha_i + \eta_t + \beta_1 maexp_{it-1} + \beta_2 fd_{it} + \beta_3 cv_{it} + \varepsilon_{it} \quad (12)$$

Where $maexp$ represents manufactured export as a share of total export, fd stands for financial development indicators; cv is a set of control variables (Gross Domestic Product per capita, Investment, Institutional quality), which may affect trade pattern in international trade. α_i is respectively country-specific effect, absorbing time-invariant factors, such as culture, legal origin, historical determinants and other geographical endowments being determinant of comparative advantages as proposed in earlier literature. η_t is a period specific dummy to capture structural changes that are common to all countries. ε_{it} is an idiosyncratic error in the

model. α and β are parameters to be estimated. Our specification intends to be canonical in nature.

The presence of lagged dependent variables allows for the modelling of a partial adjustment mechanism. The presence of lagged dependent variable as a regressor incorporates the entire history of it, and any impact of x'_{it} on $mvaexp_{it}$ is conditioned on this history.

3.2. Estimation strategy

A dynamic model as specified as equation (12) is prone to dynamic panel bias (Nickell, 1981) since lagged dependent variable is correlated with the disturbance terms. In order to solve potential endogeneity and deviation estimation caused by variables, the Arellano and Bond (1991) estimator was the most popular estimator used in the literature. Arellano and Bond (1991) propose the application of first-difference generalised method of moments (GMM) estimators to estimate a dynamic panel data model. They suggest the use of lagged level dated $t-2$ of the dependent variable and earlier can be used as instruments for the equations in first differences. GMM estimator controls for endogeneity by using "internal instruments" that is, instruments based on lagged values of the explanatory variables.

In fact, the independent variables can be endogenous or strictly exogenous. In addition, the idiosyncratic error term ε_{it} can be serially uncorrelated, whereas unobserved heterogeneity (μ_i), such as geography, demographic and cultures, can be correlated with the independent variables. The lagged dependent variables $maexp_{it-1}$ is correlated with independent variables by construction. The financial development indicators are assumed to be endogenous because causality may run in both directions, from financial development to manufacturing exports and vice versa. These regressors may be correlated with error term. The unobserved specific heterogeneity (α_i) is eliminated with the first differencing, and the equation looks like this:

$$\Delta maexp_{it} = \rho \Delta maexp_{it-1} + \beta_1 \Delta fd_{it} + \beta_2 \Delta cv_{it} + \Delta \varepsilon_{it} \quad (13)$$

By transforming the regressors by first differencing the fixed country-specific effect is removed, because it does not vary with time. Arellano and Bond (1991)'s estimator was designed for small *T* and large *N* panel. However, in large-T panels a shock to the country's fixed effect, which shows in the error term will be insignificant (Roodman, 2006).

Blundell and Bond (1998) develop a system GMM estimator by introducing an additional stationarity restriction to the "differenced GMM" estimator. They show that this difference GMM estimator may be subject to a large downward finite-sample bias, especially when the number of the time period is small. they showed that when the independent variables are persistent over time lagged levels of the dependent variable are weak instruments in first

differences. In these cases, severe problems of identification can lead to bias and could result in a poorly performing differenced estimator. To obtain a linear GMM estimator better suited to estimate autoregressive models with persistent panel data, they consider the additional stationarity assumption. This assumption requires a stationarity restriction on the initial conditions $maexp_{i1}$. These allow use of lagged first-differences of the series as instruments for equation in levels, as suggests by Arellano and Bover (1995). In other words, Blundell and Bond (1997) instruments level with differences whereas Arellano and Bond (1991) instruments differences with levels.

On the other hand, equation (13) magnifies gaps in unbalanced panels (as in our data). Taking first difference may result in some $maexp_{it}$ to be missing. As such, Arellano and Bover (1995) propose "orthogonal deviations". This suggests contemporaneous variable being subtracted from the average of all future available observations to minimise data loss. An added advantage of orthogonal deviation is that, lagged observations in this transformation would be valid instruments. As T increases, the number of instruments proliferates. The instrument for the transformed $maexp_{it-1}$ is $maexp_{it-2}$.

To improve efficiency, Holtz-Eakin, Newey, and Rosen (1998) suggest building a set of instruments from the second lag of the dependent variable for each time period and substitute zeros for missing observations. Alternatively, the instrument set can be collapsed, as in our estimation, into a single column. In addition, when estimating the dynamic panel model, Roodman (2009) recommends that lags 2 and up of the endogenous variables can be used as instruments in practice. One lag is valid for predetermined but not strictly exogenous variables. The consistent GMM estimator hinge heavily on the assumption that the instruments are orthogonal to the errors. However, in finite sample the instruments are often at least slightly correlated with endogenous components of the instrumented regressors. This suggests that this estimator is biased. The two-step estimator is efficient and robust to any pattern of heteroskedasticity and autocorrelation. Windmeijer (2005) devices a sample correction for the two-step standard errors. With this correction, the two-step standard error is quite accurate and it seems modestly superior to the cluster-robust one-step ones.

We use the $xtdpdgmm$ command introduced by Kripfganz (2019) for system GMM estimation with the non-linear moment conditions of Ahn and Schmidt (1995). Besides the conventional difference GMM, system GMM, and GMM with forward-orthogonal deviations, additional nonlinear moment conditions can be incorporated. In addition, besides one-step and feasible efficient two-step estimation, iterated GMM estimation is possible as well. The collapse option

in the $xtdpdgmm$ command is used to control too many instruments. While the two-step estimator is asymptotically efficient (for given a set of instruments), in finite samples the estimation of the optimal weighting matrix might be sensitive to the chosen initial weighting matrix. Hansen, Heaton and Yaron (1996) suggest to use an iterated GMM estimator that updates the weighting matrix and coefficient estimates until convergence. The iterated GMM estimator removes the arbitrariness in the choice of the initial weighting matrix (Hansen and Lee, 2019).

On other hand, absence of serial correlation in error term (ε_{it}) is a necessary condition for validity of $maexp_{it-2}, maexp_{it-3}$, ... as instruments for the first-differenced model. Ahn and Schmidt (1995) suggest to exploit additional non linear (quadratic) moment conditions. These nonlinear moment conditions are redundant when added to the sys-GMM moment conditions (Blundell and Bond, 1998) but improve efficiency when added to the diff-GMM moment conditions. Furthermore, they may provide identification when the diff-GMM estimator does not (Gorgens, Han, and Xuen 2019). It worth to note that the nonlinear conditions remain valid even when the sys-GMM moment conditions for the level model are not.

The advantage of using xtdpdgmm is to overcome a weak instrument problem of the Arellano and Bond (1991) difference GMM estimator, Arellano and Bover (1995), Blundell and Bond (1998) when the autoregressive dependent variable coefficient approach unity.

No previous study on the determinants of manufacturing export used the new methodological approach used in this paper (i.e., xtdpdgmm) in combining both linear and non-linear moment conditions as instruments to improve efficiency gains and standard error performance in two-step system GMM estimators. Therefore, our study aims to close this gap in the literature that already exists.

The Sargan / Hansen test is used for joint validity of the instruments. Additionally, Arellano and Bond (1991) develop an autocorrelation test for the idiosyncratic disturbance term to test whether the lags are valid instrument. Since $\Delta\varepsilon_{it}$ is mathematically related to $\Delta\varepsilon_{it-1}$, negative first-order serial correlation in level, it is needed to look for whether second-order correction in difference exists (that is, correlation between ε_{it-1} in $\Delta\varepsilon_{it}$ and ε_{it-2} and $\Delta\varepsilon_{it-2}$). A rejection of second order autocorrelation indicates no autocorrelation of the disturbance term in level. In other words, to test the validity of our preferred specification, we are looking for an $AR(1)$ test that rejects the null hypothesis but an $AR(2)$ test that cannot reject the null hypothesis.

4. Empirical results

Traditional financial-real economic literature focus on the size measure of financial systems, namely, the ratio of bank credit or broad money to GDP (Beck and Levine, 2004). Similarly, the literature on the relationship between financial development and international trade focus on the breath of financial systems. We first assess the effect of bank credit on manufacturing export.

Table 1 shows the system GMM estimation results of the typical model employed in the literature. The dependent variable is manufacturing export as share of total export, regressed on the lagged value of manufacturing exports and a set of controls variables : investment (inv), gross domestic product per capita, government effectiveness (all variables are in logs, except for government effectiveness). All variables are cross sectionally demeaned to account for unobserved dependence across country output which is correlated with the common shocks. Regressions are implemented with Windmeijer (2005) correction for robust standard error[5]. Consistency and efficiency of the GMM estimator are tested employing the $AR(2)$ test (Arellano-Bond for second-order autocorrelation) and the Hansen test. In the $AR(2)$ test, the null hypothesis is that the differenced error term is not second order serially correlated. In the Hansen test, the null hypothesis is overall validity of the instruments used, in other words, the endogeneity issue is properly addressed.

On the other hand, in the regression, all sets of instruments are collapsed. Moreover, the number of groups (30 countries) is greater than number of periods (20 years) and the number of instruments is lower than the number of groups[6]. By meeting all the above requirements, we control instrument proliferation which can be concern in GMM estimations since it vitiates the Hansen test : it leads to the under rejection of overidentification tests, thus incorrectly signalling that the model is correctly specified when it is not (Roodman, 2009). To obtain estimator that is also robust to deviation from mean stationarity, following the suggestion of Ahn and Schmidt (1995), we include additional moment condition. We thus run our regression employing the Ahn and Schmidt (1995) nonlinear estimator[7].

Table 4 shows the outcomes of system GMM estimations using xtdpdgmm for effects of financial development, proxies by bank credit to private sector and broad money, on manufacturing exports in Africa from 2000 to 2021. Our results in columns (1) and (2) of table

[5] The SYS-GMM estimations are performed with stata command xtdpdgmm.
[6] The rule of thumb is to keep the number of instruments les than or equal to the number of groups.
[7] The SYS-GMM estimations that include the Ahn and Schmidt (1995) nonlinear moment condition are implemented with stata command xtdpdgmm (Kripfganz, 2019)

4, show that the estimated coefficients of both bank credit and broad money are negative, but significant only for bank credit. The insignificant effect confirms the vanishing effect result of the literature. Indeed, employing data include that includes the post-2000 period, Rousseau and Wachtel (2011) showed that the empirical link between finance and growth is lost. Conversely, in both regressions, investment and gross domestic product per capita have the expected positive sign. While in model 1 both investment and income per capita are significant, in model 2, only estimated coefficient of investment is significant. As to the estimated coefficient of government effectiveness the results show a negative sign. The estimations are robust to serial correlation and endogeneity issues; all the requirements are met to avoid instrument proliferation and undetected endogeneity.

The performance of the lag dependent variable coefficients (i.e. 0.62) is the best estimates compared to Blundell and Bond (1998) estimates when the auto-regressive dependent variable coefficient almost approaches unity. The lagged variable (manufacturing exports) is positive and significant. This implies that the effects of past manufacturing exports play an important role in current manufacturing exports in the region.

In model 1, partially, effect of financial development indicator approaches with credit to private sector as a share GDP has significant probability at 1%, but toward the negative influence 0.3528. in other words, in our sample, a 1% rise in the credit to private sector is associated with 0.35 % decrease in manufacturing exports. The significantly negative coefficient of private credit coefficient, is beyond our expectation. However, it is acknowledged that there exists increasing return to scale in manufactured goods production (Antweiler and Trefler, 2000), then it can be expected that middle-long credit naturally plays a more important role in promoting manufactured goods production than short credit, which characterised most countries in our sample. Besides, financial development can negatively impacted manufacturing exports due to misallocation of credit. In fact, the misallocation arises because financial institutions prioritise lending to sectors with higher perceived return or lower risk, which can crowd out credit to manufacturing sectors, particularly in economies where bank have a limited understanding of the specific needs of manufacturing industries (Rajan and Zingales, 1998). In model 2, the estimated coefficient of M2/GDP indicator is negative but it is not statistically significant with a probability of more than 10%. This results suggests, country's manufacturing export does not depend on the supply of broad money, or there is no evidence that broad money obviously affects the export of manufactured goods.

The effect of investment on manufactured export has also been estimated. In both models, investment has a positive effect on manufactured export. the significantly positive effect is about 1.36, which mean that generally an increase by 1% of investment lead to an increase by 1.36% in manufactured export, other things being equal. Such result shows us a strong promotion effect of investment (capital accumulation) on the adjustment of Africa's export structure. Our estimation further justifies the importance of physical capital in promoting manufacturing export.

The results in model 1 show that the adjustment of trade structure is closely related with economic development stage. There is evidence that the share of manufacturing export is accordingly higher for more developed countries. According to our results, an increase by 1% in gross domestic product leads to an increase by about 0.53% in manufactured export, other things being equal.

Finally, while the estimated coefficient of government effectiveness in both model is negative, it is significant in model 2 buts not in model 1, which demonstrates government reform does benefit to manufacturing sector. The estimated value of −0.39 for governance effectiveness is unexpected, as improved governance is generally expected to enhance economic performance, including exports. However, this negative relationship could be explained by several factors. First, in some African countries, governance reforms may have been implemented too slowly or ineffectively, creating administrative frictions that delay the adaptation of manufacturing industries to new regulations. This could also reflect a context where governance improvements do not immediately translate into international competitiveness gains, as institutional rigidities may persist. Additionally, improved governance might sometimes entail painful reforms (such as subsidy reductions or stricter fiscal policies), which, in the short term, could negatively affect the competitiveness of the manufacturing sector.

This result highlights the complexity of the relationship between governance and industrial development, which can vary depending on institutional contexts and economic sectors. According to Kazmi and Wong (2001), governance improvements in certain context may not immediately benefit the manufacturing sector due to institutional rigidities and transitional costs. These counterintuitive findings align with the work of Rodrik (2008), who discusses the complexities and potential short-term disruptions caused by governance reforms.

Table 1 : Estimation results for financial development on manufacturing in Africa

Dep. Variable: manufactured export to total export	**Model 1: sys-GMM**	**Model 2: sys-GMM**
ln_maexp(-1)	0.623***	0.609***
ln_bcred	- 0.353*	
ln_m2		-0.613
ln_inv	1.357***	1.390***
ln_gdppc	0.529**	.484
gov_eff	-0.228	-.386*
Number of observation (N)	579	576
Number of groups	30	30
Sargan test ρ value	-0.4419	-0.4002
Sargan-Hansen test	10.6934 (0.4693)	0.5624
Number of instruments	16	16
Moment condition		
Linear	16	16
Non linear	1	1

Note: ***ρ<0.01, **ρ<0.05

Conclusion

The role of financial development as an important source for economic growth and development has been well established in the literature. In international trade, financial development has also pointed out to play a significant role in shaping comparative advantage. There are, however, only few studies on this subject, particularly for Africa. In particular, although the role of financial development on exports has attracted attention in recent years, there is little empirical evidence that support between financial development and comparative advantage.

This paper examined the effect of financial development on manufactured export in 30 African countries from 2000 to 2021 using xtdpdgmm that implement the two-system GMM estimator. The findings show that financial development has a negative effect of manufactured export, but whether it is significant depends on proxy of financial development we use. While credit to private sector was significant, broad money is not significant. Second, investment and economic development have the expected positive sign. Improving this factor leads to increasing manufactured export. Third, quality of institution, measured by government effectiveness, has detrimental effect on manufactured export.

The policy implication of our findings is very significant. Given the fact that, in many African countries financial systems tend to be underdeveloped and well inside the global financial frontier, policies that improve financial development could be complement to trade policies. Thus, through the development of financial systems, African countries can change their comparative advantage from exporting primary low productivity products to high productivity manufacturing commodities. In addition, according to our results, there is a need for African government to raise human investment and economic development. Accumulation of physical capital benefit to manufacturing sector and lead to increase in manufacturing export.

While the finding in this paper argue that financial development caused a decrease in the level of manufacturing exports, a component of export about which this paper has been silent concerns the disaggregated export data. As the type of manufacturing products may affect demand for financial services, such data may be valuable for depth analysis. As such, one potentially important question for future research concerns the extent to which financial development affects export for different kind of products.

ANNEXES

List of Countries: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Côte d'Ivoire, Egypt (Arab Republic), Eswatini, Gabon, Gambia, Ghana, Kenya, Lesotho, Madagascar, Mali, Mauritania, Mauritius, Morocco, Namibia, Niger, Rwanda, Senegal, Seychelles, South Africa, Tanzania, Togo, Tunisia, Uganda, Zimbabwe.

Table A1: Description of the used variables

Variable	variable label	Source
Maexp	Share of manufactured exports in total export	World Development Indicator, (WDI, 2024)
bcred	Domestic credit provided by financial sector (% of GDP)	WDI, 2024
m2	Broad money supply (% of GDP), it measures the size of the banking sector rather than the overall performance.	WDI, 2024
Inv	Gross fixed capital formation (% of GDP)	WDI, 2024
Gdppc	GDP per capita (constant 2011 international $)	WDI, 2024
gov_eff	Institution (government effectiveness estimate)	WDI, 2024

Source: Author's construction

Table 2: Summary statistics

Variable	mean	sd	Sd Between	Sd Within	xtn	obs	Xttbar
Maexp	31.32	26.96	25.7	9.3	30	657	21.90
Bcredit	24.41	19.32	18.3	6.7	30	644	21.47
m2	38.41	26.56	24.7	10.1	30	641	21.37
Inv	21.25	7.76	6.2	4.8	30	653	21.77
Gdppc	2509.43	2955.36	2955.7	526.0	30	660	22.00
gov_eff	-0.50	0.59	0.6	0.2	30	630	21.00

Source: author computation

Table 3: Correlation matrix between all the variables of the study

	ln_maexp	ln_bcredit	L_m2	ln_inv	ln_gdppc	gov_eff
ln_maexp	1					
ln_bcredit	0.330***	1				
ln_m2	0.343***	0.860***	1			
ln_inv	-0.118***	0.171***	0.199***	1		
ln_gdppc	0.216***	0.628***	0.648***	0.299***	1	
gov_eff	0.222***	0.604***	0.618***	0.377***	0.717***	1

Source: author's computation, Lower-triangular cells report Pearson's correlation coefficients, upper-triangular cells are *** p<0.01, ** p<0.05, * p<0.1.

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