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Abstract

This paper examines the effect of financial development on industrialisation in a panel of 43 sub-Saharan African countries over the period 2000–2021. Using a dynamic panel model estimated using the System GMM method, the results show a positive and significant effect of financial development on industrialisation. The multidimensional analysis indicates that financial depth is the main driver, followed by accessibility and efficiency. A mediation analysis reveals that this effect is partly mediated through private investment and total factor productivity. The robustness of the results is confirmed using alternative fixed-effects estimates with instrumental variables (FE-2SLS). Overall, these results highlight the key role of financial institutions in supporting structural transformation and industrial development in sub-Saharan Africa.

Keywords: Financial development, Industrialisation, Sub-Saharan Africa, GMM system

JEL codes: G21, O16, O47, O55, C36

Introduction

Industrialisation is widely recognised as a central driver of structural transformation and sustainable economic growth (Gui-Dibyand Renard, 2015; United Nations, 2022). Historically, economies that have succeeded in reducing poverty and improving living standards have experienced significant expansion of their manufacturing sector, characterised by productivity gains, increased industrial employment, and greater diversification of production. The development of the manufacturing sector promotes technological learning, stimulates innovation, facilitates integration into global value chains, and strengthens international competitiveness (Rodrik, 2016; Lin and Monga, 2017; Economic Commission for Africa, 2022).

However, sub-Saharan Africa remains largely on the sidelines of this dynamic. Despite several decades of economic reforms and industrial policies, the region remains one of the least industrialised in the world. In 2022, it accounted for only around 1.42% of global manufacturing value added, compared with 45.87% in East Asia and the Pacific and 21.55% in Europe and Central Asia¹. Furthermore, the manufacturing sector's contribution to regional GDP has declined, falling from 16.13% in 1990 to 11.17% in 2020 (Hamilton, 2024), reflecting persistent difficulties in initiating sustainable structural transformation and establishing a competitive industrial base.

The literature attributes this industrial weakness to a set of structural constraints, notably inadequate infrastructure, weak institutions, macroeconomic instability, and financing constraints (Totouom, 2018; Economic Commission for Africa, 2022). Among these factors, access to finance appears to be particularly decisive. In successful industrialisation trajectories, the financial system has played a crucial role in mobilising domestic savings and channelling them towards long-term productive investments.

However, in many sub-Saharan African countries, the financial system remains underdeveloped and does not effectively support the expansion of the productive sector. Domestic credit granted by financial institutions accounts for a relatively small share of GDP, averaging 50% between 2000 and 2009, then 41.7% between 2010 and 2022, levels significantly lower than those observed in advanced economies (often exceeding 170% of GDP) or in East Asia and the Pacific (147.7%)². This low financial depth limits the ability of enterprises, particularly industrial ones,

¹ World Bank, 2025.

² World Bank, 2023.

to finance their investments, modernise their productive capital, and improve their productivity. Added to this are institutional constraints such as information asymmetries, weak credit registers, insufficient creditor protection, and the high cost of finance, which reduce the efficiency of financial intermediation (McDonald and Schumacher, 2007; Triki and Gajigo, 2011).

Economic theory highlights the fundamental role of financial development in growth and industrialisation. Schumpeter (1911) emphasises that finance promotes innovation by facilitating the financing of entrepreneurial projects, whilst King and Levine (1993) demonstrate that it improves resource allocation and stimulates capital accumulation. However, recent research highlights non-linear effects, suggesting that the positive impacts of financial development only become apparent beyond a certain threshold (Aghion and al., 2019; Kothakapa and al., 2021; Kinda and Sawadogo, 2023).

Despite the abundance of literature, it still has major limitations: (i) empirical results that vary across contexts, (ii) the use of aggregate indicators that do not distinguish between the dimensions of financial development, and (iii) insufficient analysis of the transmission channels to industrialisation, particularly in African economies where banking intermediation dominates.

Against this backdrop, this paper analyses the extent to which the development of financial institutions promotes industrialisation in sub-Saharan Africa. It makes a threefold contribution. Firstly, it focuses specifically on financial institutions, which better reflects the structure of the region's financial systems, dominated by banking intermediation. Secondly, it adopts a multidimensional approach to financial development by distinguishing between access, depth, and efficiency in order to identify the transmission channels to the manufacturing sector. Thirdly, it employs a rigorous empirical strategy to address issues of endogeneity and cross-country heterogeneity, using a dynamic panel model estimated via the System GMM method, supplemented by alternative fixed-effects estimates with instrumental variables (FE-2SLS).

The empirical analysis, based on a panel of 43 sub-Saharan African countries over the period 2000–2021, highlights several key findings. Firstly, the development of financial institutions has a positive and statistically significant effect on manufacturing value added. Secondly, the multidimensional analysis shows that the various components of financial development contribute to industrialisation, with financial depth being the most significant, followed by access and efficiency. Thirdly, the mediation analysis reveals that this effect is partly mediated

by private investment and total factor productivity. Finally, the results remain robust to alternative specifications, which reinforces the credibility of the conclusions.

The remainder of the paper is structured as follows. Section 1 presents a review of the theoretical and empirical literature. Section 2 describes the hypotheses. Section 3 presents the data and econometric methodology. Section 4 sets out the empirical results. Finally, Section 5 concludes and formulates economic policy recommendations.

I. Financial development and industrialisation: a review of the literature

1) Theoretical framework

The relationship between financial development and industrialisation rests on solid theoretical foundations. Classical works (Schumpeter, 1911; Goldsmith, 1969; Bagehot, 2008) highlight the supply-side hypothesis, according to which a developed financial system stimulates productive activity by mobilising savings, channelling credit towards entrepreneurs and innovative projects, and facilitating the diffusion of technology. Within this framework, financial development promotes growth in the manufacturing sector, capital accumulation, and innovation.

The theory of financial liberalisation (McKinnon, 1973; Shaw, 1973) complements this framework by demonstrating that the removal of financial distortions, such as administrative control of interest rates and restrictions on credit allocation, improves the efficiency of financing for productive investment. More recent models incorporating information frictions and market imperfections (Pagano, 1993; Levine, 1997) emphasise that the efficiency of the financial system depends on its ability to reduce information asymmetries, diversify risks, and allocate resources to the most productive activities.

These theoretical mechanisms suggest that financial development can affect industrialisation directly, by supporting production and value added, and indirectly, through channels such as private investment and total factor productivity.

2) Empirical evidence

The empirical literature on the relationship between financial development and industrialisation is largely grounded in the Schumpeterian perspective, which argues that financial deepening promotes capital accumulation, technological innovation, and structural transformation. Existing studies generally distinguish between direct and indirect effects of finance on industrial performance. While the direct effect operates through the financing of productive activities, the

indirect effect occurs through improvements in allocative efficiency, innovation, and productivity. Nevertheless, empirical findings remain mixed and highly dependent on institutional contexts, financial indicators, and econometric methodologies.

Financial Development and Manufacturing Performance : Direct Effects

At the macroeconomic level, several country-specific studies support the existence of a positive relationship between financial development and manufacturing sector growth. In Pakistan, Ahad and al. (2019), using the Bayer and Hanck (2013) cointegration approach, show that private sector credit and domestic savings positively affect industrial production in the long run. Similarly, Ngong and al. (2021), applying ARDL and Engle–Granger techniques to the case of Cameroon, find that the expansion of bank credit and money supply significantly improves manufacturing productivity. In Nigeria, Akinmulegun and Akinde (2019), through an Error Correction Model (ECM), demonstrate that private sector credit and stock market capitalisation significantly stimulate manufacturing output.

These findings are further supported by panel data evidence. Using a system GMM estimator for 30 Sub-Saharan African countries over the period 1995–2019, Nwani and al. (2023) show that financial development promotes structural reallocation towards manufacturing and service activities at the expense of extractive sectors. Likewise, Akinyemi and al. (2018), through fixed-effects estimations, confirm the positive contribution of banking liquidity and money supply to industrial activity whilst highlighting the crowding-out effect of high interest rates on productive investment.

However, the finance–industrialisation nexus is not always linear or unconditional. Arcand and al. (2015) argue that excessive financial expansion may generate allocative inefficiencies and weaken economic growth beyond a certain threshold. Similarly, Aghion and al. (2019) emphasise that institutional quality and innovation capacity play a critical role in determining the effectiveness of financial systems in developing economies.

Indirect Channels: Allocative Efficiency, Innovation, and Structural Transformation

Beyond its role in financing productive activities, financial development also affects industrialisation through several indirect transmission mechanisms.

The first mechanism relates to allocative efficiency. Using spatial econometric models based on Chinese provincial data from 2006 to 2018, Xu and Tan (2020) demonstrate that financial

development improves resource allocation efficiency and accelerates structural transformation by facilitating the reallocation of capital towards more productive sectors.

The second mechanism concerns the complementarity between finance and foreign direct investment (FDI). Jiang and al. (2020), using Chinese provincial data over the period 2008–2016, show that a developed financial system enhances local absorptive capacity and strengthens the impact of FDI on industrial upgrading. In this context, financial intermediation facilitates technological diffusion and industrial learning.

The third mechanism involves innovation and productivity enhancement. Using data from 22 manufacturing industries across 18 OECD countries, Maskus and al. (2012) find that financial market development positively affects research and development (R and D) intensity and industrial productivity. Their findings suggest that deeper financial systems reduce financing constraints on innovation and support long-term productive investment.

However, the effectiveness of these channels depends largely on the dimension of financial development considered. Beck and Demirgüç-Kunt (2008) and Svirydenka (2016) emphasise the multidimensional nature of financial systems. While financial depth reflects the ability of the financial system to mobilise resources, financial access captures the extent to which firms, particularly small and medium-sized enterprises (SMEs), can obtain financing. Financial efficiency, by contrast, refers to the quality of intermediation and resource allocation. This distinction is particularly important in African economies, where quantitative credit expansion does not necessarily translate into productive transformation.

In this regard, Itaman and Awopegba (2021) show that the impact of bank credit on industrialisation in Nigeria depends critically on sectoral allocation. Their findings indicate that only credit directed towards productive sectors, particularly through development banks, generates significant industrial gains, whereas financial flows towards oil-related and tertiary activities produce weak or even negative effects on manufacturing performance.

3) Research gap and contribution

Despite an extensive body of literature, the relationship between financial development and industrialisation remains characterised by mixed results that are highly dependent on institutional contexts (Arcand and al., 2015; Aghion and al., 2019). Furthermore, the majority of studies rely on one-dimensional indicators, neglecting the multidimensional nature of financial development (IMF, 2016). Moreover, transmission channels remain insufficiently

explored, particularly the role of private investment and productivity in the industrialisation process (Pagano, 1993; Levine, 1997).

This study addresses these gaps by adopting a multidimensional approach to financial development and highlighting differentiated effects according to its components. It also identifies significant transmission channels, demonstrating that private investment and total factor productivity are key mechanisms through which finance stimulates industrialisation, particularly in the context of sub-Saharan Africa.

II. Research hypotheses

Drawing on the theoretical and empirical arguments presented in the literature, this study examines the relationship between the development of financial institutions and industrialisation in sub-Saharan Africa, taking into account the multidimensional nature of finance and the identified transmission channels. The hypotheses formulated are as follows:

H1: The development of financial institutions promotes industrialisation.

This hypothesis is based on the idea that sound financial institutions play a central role in financing productive investment. By mobilising savings and efficiently channelling resources to industrial enterprises, a developed financial system facilitates capital accumulation, innovation, and the expansion of manufacturing output. Empirical evidence shows that the expansion of credit to the private sector and financial deepening are associated with faster growth in the manufacturing sector and greater economic diversification (King and Levine, 1993; Levine, 1997; Nwani and al., 2023).

H2: The various dimensions of financial development (depth, access, and efficiency) contribute positively to industrialisation, although their effects differ according to the specific functions they perform within the financial system.

As financial development is a multidimensional phenomenon (Beck and Demirgüç-Kunt, 2008; Svirydzenka, 2016), its different dimensions influence industrialisation through distinct mechanisms. Financial depth is expected to exert a stronger effect because it reflects the capacity of the financial system to mobilise large volume of savings and provide long-term financing for productive investment, which is essential for industrial expansion and capital

accumulation (King and Levine, 1993; Levine, 1997). In developing economies, where industrial activities are often constrained by insufficient capital and underdeveloped financial markets, greater financial depth facilitates access to credit for manufacturing firms and supports structural transformation.

Financial access also plays an important role by reducing financing constraints faced by firms, particularly small and medium-sized enterprises (SMEs), which are central to industrial development in sub-Saharan Africa. Improved access to financial services promotes entrepreneurship, investment, and technological adoption by enabling firms to obtain the resources needed for production and expansion (Beck and al., 2005). However, its impact may remain lower than that of financial depth because access alone does not guarantee the availability of sufficient long-term resources for large-scale industrial investment.

Finally, financial efficiency is also expected to positively affect industrialisation by improving the allocation of financial resources toward the most productive sectors and reducing intermediation costs. Efficient financial institutions enhance investment quality and support productivity gains by directing credit toward profitable industrial activities (Pagano, 1993). Nevertheless, in many developing economies characterised by shallow financial systems and structural market imperfections, the effect of efficiency may be comparatively weaker, as the limited size of financial markets and restricted access to finance continue to constrain industrial development.

H3: Financial development influences industrialisation through indirect channels, notably private investment and total factor productivity.

This hypothesis emphasises that the effect of financial development on industrialisation is not limited to a direct impact via corporate financing, but also operates through transmission mechanisms. Indeed, according to the ‘finance and economic growth’ theory, private investment is the main channel, by promoting the accumulation of productive capital, whilst total factor productivity represents a second channel, linked to efficiency gains and innovation (Pagano, 1993; Levine, 1997).

III. Methodology

1) Model specification

Direct effects

To examine the direct effects of financial institution development on manufacturing value added (H1) and its various dimensions (H2), we adopt a dynamic panel model inspired by the theory of endogenous growth with financial frictions (Pagano, 1993; Levine, 1997). The specification includes lagged manufacturing value added to capture the dynamics of capital accumulation and sectoral productivity. The model also controls for unobservable country-specific heterogeneity as well as common time-varying shocks, and progressively incorporates the main dimensions of financial institutional development: accessibility, depth, and efficiency.

The empirical specification is as follows:

$$MVA_{it} = \alpha + \beta_1 MVA_{it-1} + \beta_2 FID_{it} + \gamma' X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where MVA_{it} is manufacturing value added in country i in period t , FID_{it} measures the development of financial institutions, and X_{it} comprises the control variables. The terms μ_i and λ_t capture country and time fixed effects, respectively, whilst ε_{it} represents the error term.

Estimating this model presents significant econometric challenges related to endogeneity. The inclusion of the lagged variable MVA_{it-1} introduces a dynamic dependency that renders the use of OLS inappropriate. Indeed, in a dynamic panel with fixed effects, ' MVA_{it-1} ' is correlated with the error term ' ε_{it} ' after transformation into first differences, leading to biased and inconsistent estimators (Nickell, 1981).

Furthermore, causality may be bidirectional: financial development may stimulate industrialisation, but industrial expansion may also promote financial deepening (Shahbaz and al., 2018; Cetorelli and Strahan, 2006; Rajan and Zingales, 1998). Other sources of endogeneity, such as omitted variables, measurement errors, or unobserved specific effects correlated with the regressors, exacerbate this problem.

To overcome these limitations, we use the System GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998), which allows us to simultaneously address dynamics, endogeneity, and unobserved specific effects by constructing endogenous instruments from the lagged values of the explanatory variables. This method is suitable for panels with a large cross-sectional

dimension and a short time dimension ($N \gg T$) and improves the efficiency of the estimates by combining difference and level equations, thereby reducing biases associated with the low persistence of the instruments (Roodman, 2009). Furthermore, the validity of the instruments is verified using the Sargan-Hansen test, and the absence of second-order autocorrelation in the residuals is checked using Arellano-Bond AR tests.

Analysis of transmission mechanisms

In this subsection, we examine the effect of financial institution development on industrialisation using a mediation analysis (H3). There are two main reasons for this analysis. Firstly, the literature identifies factors that help to understand how financial development creates conditions conducive to industrialisation (Shahbaz and al., 2018; Lo and Cissokho, 2023). Drawing on empirical research on the subject, this study identifies two main mechanisms: private investment and total factor productivity. Secondly, the mediation analysis will help refine our understanding of the causal relationship between financial development and industrialisation by distinguishing between direct and indirect effects. To conduct our mediation analysis, we use the approach of McKinnon and al. (1995) as follows:

$$Z_{it} = a_1 + b_1 FID_{it} + \beta_1 X_{it} + \mu_{it} \quad (2)$$

$$MVA_{it} = a_2 + b_2 FID_{it} + b_3 Z_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (3)$$

where Z_{it} represents one of our mediating variables; MVA_{it} is the industrialisation indicator; and X_{it} is the vector of control variables. Using equations (5) and (6), the indirect effects are calculated as follows: $b_1 * b_3$ where b_2 is the direct effect.

The coefficient b_1 , which represents the impact of financial institution development on the mediator, is estimated in equation (1). The direct effect is estimated by regressing financial development on industrialisation, whilst controlling for the mediator, in equation (6). The magnitude of this effect is determined by the coefficient b_2 . The indirect effect is represented by the product $b_1 * b_3$, where b_3 represents the strength of the correlation between industrialisation and the mediator in Model 2. This term also reflects the importance of mediation, which is primarily determined by the extent to which the mediator is influenced by financial development and by the extent to which it is influenced by industrialisation.

Furthermore, the Sobel test (1982) is applied to further support this mediation analysis. This test checks whether the presence of a mediating variable significantly reduces the indirect

influence of the variable of interest on the dependent variable. More specifically, it allows the use of various mediation tests to determine whether the indirect impact of financial development on industrialisation, via total productivity and private investment, is statistically different from zero.

2) Data and variables

The data are drawn from World Bank and IMF databases and cover a panel of 43 sub-Saharan African countries over the period 2000–2021. The sample selection is based both on data availability and on the relevance of the industrial and financial trajectories observed in these countries.

The dependent variable is manufacturing value added (MVA) as a percentage of GDP, commonly used in the literature to measure the degree of industrialisation (Gui-Diby and Renard, 2015). This indicator reflects the manufacturing sector's actual contribution to the economy and constitutes a standard measure of structural transformation.

The main explanatory variable is financial development, represented by Svirydzenka's (2016) Financial Institution Development Index (FID)³. This composite index comprises three dimensions: depth, access, and efficiency. It thus constitutes a multidimensional measure of financial intermediation. Unlike studies using a comprehensive index that also includes financial markets, this study focuses on financial institutions, which is more appropriate in the context of the countries examined, where financial markets remain underdeveloped, and bank financing predominates.

The selected control variables reflect the main determinants of industrialisation identified in the literature. Foreign direct investment (FDI) is included as it brings not only capital but also technologies and managerial skills that can boost productivity and promote industrial diversification (Jiang and al., 2020; Xu and Tan, 2020). Revenues from natural resources (TOTRENTS) are considered due to their potential influence on industrial structure: heavy reliance on extractive sectors can divert resources away from manufacturing activities, thereby limiting the industrialisation process (Nwani and al., 2023). Per capita GDP (GDPPC) reflects the level of economic development and the size of the domestic market, factors essential for sustaining demand and economies of scale in the manufacturing sector (Maskus and al., 2012).

³ Detailed definitions, construction methods and sources of the financial development indicators are provided in Appendices : box 1.

The urban population (URBANPOP) reflects the concentration of labour and access to infrastructure, conditions conducive to industrial growth (Ahad and al., 2019). Political stability (POLSTAB) is included to assess the institutional environment, as a stable political framework reduces risks and encourages long-term productive investment (Beck and Demirgüç-Kunt, 2008).

Furthermore, gross fixed capital formation and private investment are taken into account to measure the capacity for capital accumulation and the implementation of productive projects, essential channels through which financial development can stimulate industrialisation (Pagano, 1993; Levine, 1997). Total factor productivity (TFP) is also included to capture the effect of improved efficiency and technology on manufacturing output, thereby reflecting the indirect impact of financial development through the optimisation of resource allocation and innovation (Shahbaz and al., 2018; Lo and Cissokho, 2023). Together, these variables allow us to control for the main structural, macroeconomic, and institutional determinants, whilst enabling a precise assessment of the direct and indirect effects of financial development on industrialisation.

Table 1 presents the descriptive statistics for the variables of interest as well as the control variables. It appears that the level of industrialisation in sub-Saharan Africa remains very low. Average manufacturing value added stands at 10.58% of GDP, which is nearly four times lower than that of the country with the highest rate, Equatorial Guinea (84% of GDP in 2008). The standard deviation also highlights significant variation between countries: over the period under study, manufacturing value added ranges mainly between 8% and 36% of GDP.

With regard to the development of financial institutions, the average index stands at 0.22, indicating a financial system that remains limited. This low value reflects both limited depth, that is, a limited volume of financial services relative to the economy, and low accessibility, indicating limited coverage of financial services for households and businesses.

Table 1 : Descriptive statistics for the main variables

Variables	Obs	Mean	Standard deviation	Min	Max
FID	903	0.2206024	0.1367487	0.044	0.731
ACCESS	903	0.1048062	0.1505746	0.0000	0.899
DEPTH	903	0.1155824	0.1712035	0.001	0.878
YIELD	903	0.4872713	0.1376518	0.042	0.793
MVA	890	10.57862	5.734111	0.855949	35.29295

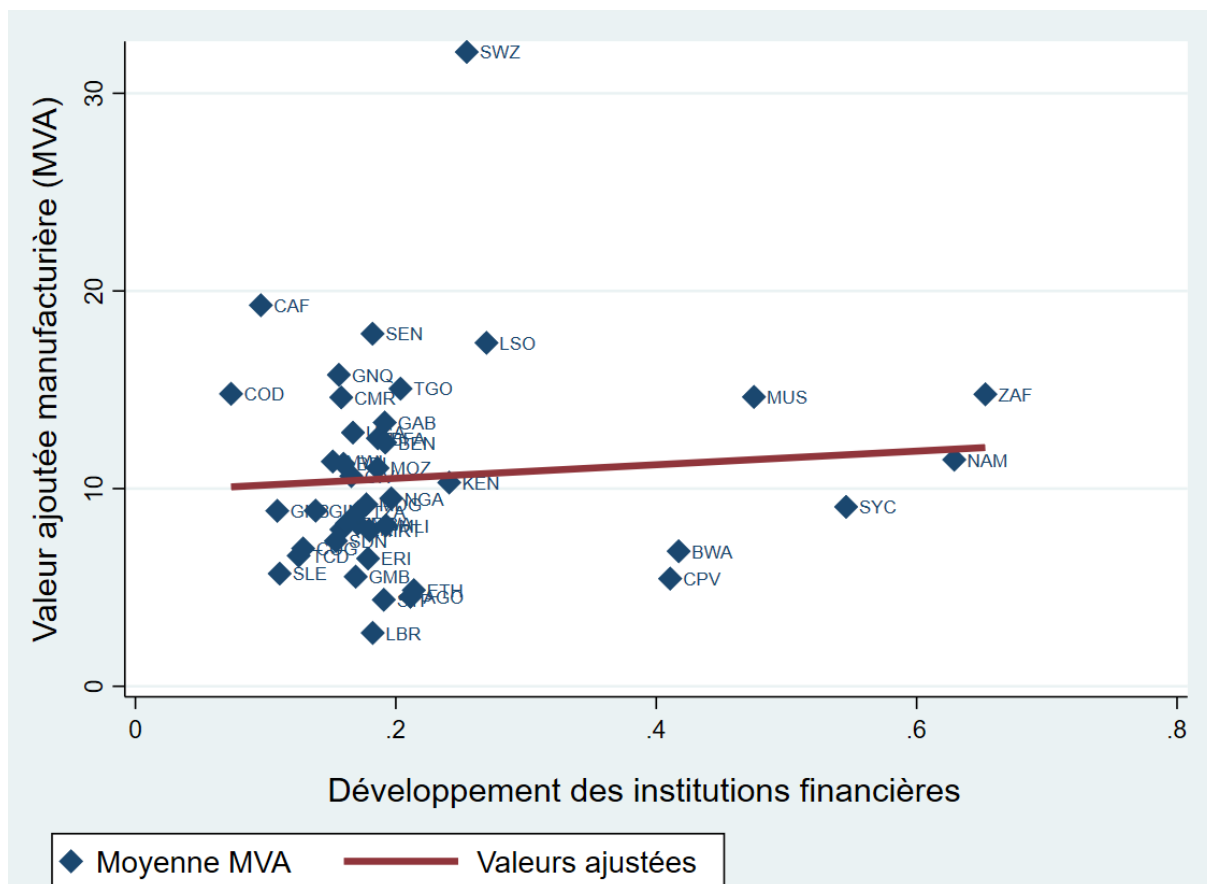
TORTURE	902	11.90793	11.5269	0.0023598	88.59235
URBANPOP	903	39.43107	16.47318	8.043814	90.34808
GDPPC	903	2,147.116	2,863.503	243.0767	19,481.65
FDI	902	4.548616	8.333782	-17.29212	103.3374
POLSTAB	860	-0.5094916	0.8905869	-2.699193	1.283142
Invest	890	9.25147	2.652474	0.024584	17.25451
Productivity	903	-0.8518	10.7624	-16.1959	21.15758

Source : World Bank and IMF

To correct for the variability in the values across the variables, a logarithm is applied to ensure stationarity and facilitate interpretation. Furthermore, 1% winsorisation is applied to all variables to reduce potential bias due to outliers in the regression results. Table A2 in the appendix provides information for each variable.

Figure 1 shows that this relationship, “financial development and industrialisation,” appears to be positive, as an increase in the financial institution development index is associated with a rise in manufacturing value added in Sub-Saharan Africa. In the following section, we attempt to rigorously test this relationship using appropriate econometric analyses.

Figure 1 : FDI and industrialisation in Africa



Source: author

IV. Estimation results

This section presents the empirical results aimed at testing our hypotheses, namely: (H1) that overall financial institution development stimulates manufacturing value added, (H2) that specific institutional dimensions (depth, access, and efficiency) play differentiated roles in industrialisation, and (H3) that financial development influences industrialisation through indirect channels.

1) Results of direct effects

The econometric analyses are based on the Arellano-Bond autocorrelation tests and the Sargan over-identification test. The results indicate the expected presence of first-order autocorrelation [AR (1)], whilst the absence of second-order autocorrelation [AR (2)] confirms the validity of the instruments used in the System GMM estimation. Furthermore, the Sargan test does not reject the null hypothesis of instrument validity, suggesting the absence of an over-identification problem (see Table 2).

The empirical results show that the development of financial institutions (FID) has a positive and statistically significant effect on industrialisation (MVA), with an estimated coefficient of 0.404. This result validates hypothesis H1 and confirms the dominant supply hypothesis. According to this hypothesis, financial institutions play a key role in mobilising savings and the efficient allocation of credit to productive activities (Bagehot, 1873; Schumpeter, 1911; Goldsmith, 1969). By facilitating access to finance, these institutions promote capital accumulation, technological innovation, and improvements in industrial productivity.

These findings are also consistent with theoretical approaches based on financial frictions, which highlight the role of the financial system in reducing information asymmetries, diversifying risks, and ensuring the optimal allocation of resources (Pagano, 1993; Levine, 1997). In developing economies, where financing constraints are particularly severe, these mechanisms appear essential for supporting the expansion of the manufacturing sector. The results thus corroborate recent empirical studies highlighting a positive effect of financial development on industrial performance, notably through the expansion of private credit and financial deepening (Ahad and al., 2019; Akinmulegun and Akinde, 2019; Ngong and al., 2021; Nwani and al., 2023).

Furthermore, the multidimensional analysis of financial development reveals differentiated effects depending on its components, thereby validating hypothesis H2. Financial depth appears to be the most influential dimension (0.345), followed by accessibility (0.215) and efficiency

(0.148). The predominance of depth is consistent with the work of Pagano (1993) and Levine (1997), who emphasise the central role of the mobilisation of financial resources in the financing of productive investment.

The positive effect of accessibility also confirms the importance of financial inclusion in reducing financing constraints for firms, particularly SMEs (Beck and Demirgüç-Kunt, 2008). Finally, the efficiency of the financial system, although of a more moderate magnitude, contributes to a better allocation of capital, in line with the arguments of Svirydzhenka (2016). Overall, these results highlight the need to combine quantitative expansion with qualitative improvements in the financial system to sustainably support industrialisation.

The results relating to the control variables provide important insights into the determinants of industrialisation. Firstly, the lagged value of manufacturing value (MVA) has a positive and significant effect, confirming the dynamic nature of the industrialisation process, characterised by inertia and the accumulation of productive capital. This result is consistent with endogenous growth models incorporating learning effects and sectoral persistence.

Per capita GDP (GDPPC) also has a positive and significant effect, indicating that the level of economic development and the size of the domestic market play a key role in industrial dynamics. This result confirms the arguments of Maskus and al. (2012), according to whom higher income boosts demand for manufactured goods, stimulates innovation, and enables the realisation of economies of scale. Similarly, political stability (POLSTAB) has a positive influence on industrialisation, highlighting the importance of a stable institutional environment for reducing uncertainty and encouraging long-term productive investment, as demonstrated by Beck and Demirgüç-Kunt (2008).

Conversely, natural resource rents (TOTRENTS) exert a significant negative effect, in line with the ‘resource curse’ hypothesis. This result is consistent with the findings of Nwani and al. (2023), who show that dependence on extractive resources can hinder structural transformation by channelling resources towards sectors with low industrial value added. However, this result is qualified when the efficiency of the financial system is taken into account: in this case, natural resource rents become a positive and significant factor in industrialisation. This suggests that, as highlighted by Pagano (1993) and Levine (1997), an efficient financial system enables better resource allocation by channelling revenues from natural resources into productive investments, thereby mitigating the negative effects associated with their exploitation.

Furthermore, urbanisation (URBANPOP) has a significant negative effect, a result that contrasts with theoretical predictions. Whilst urbanisation is generally regarded as a driver of industrialisation by facilitating the concentration of labour and access to infrastructure (Ahad and al., 2019), this finding suggests that, in the context of sub-Saharan African countries, urbanisation may be characterised by an expansion of the informal sector and a lack of industrial infrastructure, thereby limiting its positive effects on manufacturing output.

Finally, foreign direct investment (FDI) has a significant negative effect on industrialisation. This finding contrasts with the work of Jiang and al. (2020) and Xu and Tan (2020), who highlight the positive role of FDI through the transfer of technology and skills. However, it suggests that, in the context studied, FDI is predominantly directed towards extractive or low-technology-intensive sectors, which limits its impact on the development of the manufacturing sector.

Table 2: Effect of the development of financial institutions on manufacturing value added, GMM estimates.

	(1)	(2)	(3)	(4)
	FID	Access	Depth	efficiency
MVA (lag1)	0.8948*** (0.0327)	0.8722*** (0.0292)	0.8931*** (0.0315)	0.8646*** (0.0348)
FI indicators	0.4041** (0.1820)	0.2146** (0.1009)	0.3455** (0.1586)	0.1481** (0.0608)
GDP	0.1127*** (0.0389)	0.0692*** (0.0245)	0.0962*** (0.0350)	0.0586*** (0.0176)
TOTRENTS	-0.0597* (0.0306)	-0.0131 (0.0142)	-0.0493* (0.0259)	0.0298** (0.0115)
URBANPOP	-0.0929** (0.0379)	-0.0601* (0.0324)	-0.0773** (0.0345)	-0.0994*** (0.0229)
IDE	-0.0056 (0.0065)	-0.0121** (0.0059)	-0.0074 (0.0060)	-0.0350*** (0.0082)
POLSTAB	0.0409** (0.0167)	0.0172* (0.0098)	0.0353** (0.0156)	0.0072 (0.0092)
Constant	-0.0172 (0.1826)	0.0819 (0.1377)	0.0188 (0.1760)	0.3145** (0.1542)
Obs.	765	765	765	764
AR1 (p)	0.0108	0.0101	0.0105	0.0062
AR2 (p)	0.5918	0.5684	0.5835	0.4744
Country	43	43	43	43
Instrument	17	20	20	23
Hansen (p)	0.3093	0.3594	0.4726	0.3378

The figures in brackets represent robust standard errors. ***, **, *, * indicate significance at confidence levels of 1%, 5% and 10%.

2) Analysis of transmission mechanisms

Table 3 presents the results of the mediation tests for private investment and overall productivity. It highlights the indirect, direct, and total effects, as well as the share of the total effect explained by the mediation mechanism. As shown in Table 3, the Sobel test statistic is estimated at 0.046 for Column (1) and 0.031 for Column (2), with p-values below 5%. These results allow us to reject the null hypothesis of no mediation, confirming the existence of a significant indirect effect of financial institution development on industrialisation.

The analysis of mediating effects shows that private investment (Column 1) accounts for approximately 55.4% of the total effect, whilst total factor productivity (Column 2) accounts for 44.3%. These results fully support Hypothesis H3, according to which financial development influences industrialisation not only directly, but also via key economic channels. They confirm that private investment and productivity improvements are central mechanisms through which financial institutions facilitate structural transformation and industrial growth (Pagano, 1993; Levine, 1997).

Table 3: Analysis of mediation tests

	Private investment (1)	Overall productivity (2)
<i>(A) Mediation tests</i>		
Sobel ⁽¹⁾	0.046 ^{***} (0.007)	0.031 ^{***} (0.003)
<i>(B) Composition effect</i>		
Indirect effect (Sobel)	0.046	0.031
Direct effect	0.054	0.039
Total effect	0.083	0.070
% total effect	55.4%	44.3%

Note: (1) For the sake of simplicity and brevity, we have only considered the Sobel test, as the Delta and Monte Carlo test values yielded the same statistics. Standard errors in brackets. * p < 0.10, ** p < 0.05, *** p < 0.01.

3) Robustness test

In order to test the robustness of the results obtained using the GMM estimator in a dynamic panel setting, we estimate an alternative specification based on a fixed-effects model with instrumental variables, using the two-stage least squares (FE-2SLS) method. This approach constitutes a complementary strategy widely used in the empirical literature to address endogeneity issues, particularly when certain explanatory variables may be correlated with the error term. Unlike the GMM method, which primarily utilises endogenous instruments based on lagged variables, the FE-2SLS estimator allows for the explicit introduction of exogenous

instruments, thereby strengthening the credibility of the identification, as in Ross, Levine and al. (2000).

In this framework, we instrument the financial institution development variable (FID_{it}) using the variable $near_FID_{it}$, constructed as the average level of financial institution development in neighbouring countries, excluding the country under consideration. This instrument is based on the assumption of regional diffusion of institutional policies and practices, implying a significant correlation with the endogenous variable whilst remaining exogenous to domestic manufacturing performance.

The estimation is based on the standard two-stage procedure. In the first stage, the endogenous variable is regressed against the instrument and the control variables, including country and time fixed effects. In the second stage, the adjusted values of the instrumented variable are used to estimate their impact on manufacturing value added. The validity of the instrument is assessed using the Kleibergen-Paap statistic, which helps to detect the presence of weak instruments. The results indicate that the instrument used is sufficiently relevant, with the F-statistic exceeding the conventional threshold of 10.

The estimates obtained using the FE-2SLS method confirm the main results from the GMM approach. In particular, the coefficient associated with the development of financial institutions remains positive and statistically significant, with a magnitude comparable to that obtained in the main estimates. This stability of results suggests that the conclusions are not sensitive to the choice of estimation method.

Table 2: Effect of the development of financial institutions on manufacturing value added, instrumental variables (2SLS).

	(1)	(2)	(3)	(4)	(5)	(6)
Results of the second stage with MVA (ln) as the dependent variable						
FID	0.1971*** (0.0488)	0.4180** (0.1753)	0.6573** (0.2874)	0.4813** (0.2242)	0.4435** (0.2060)	0.1310** (0.0595)
GDP per capita		0.0172* (0.0104)	-0.0367* (0.0198)	-0.0160 (0.0255)	-0.0140 (0.0237)	0.0237** (0.0093)
TOTRENTS			0.0813** (0.0335)	0.0681** (0.0297)	0.0597** (0.0270)	0.0574*** (0.0122)
URBANPOP				- 0.0445*** (0.0163)	- 0.0408*** (0.0154)	- 0.0023*** (0.0003)
IDE					- 0.0077*** (0.0021)	- 0.0099*** (0.0020)
POLSTAB						0.0162**

Constant	0.1900*** (0.0110)	0.0163 (0.0527)	0.1675*** (0.0386)	0.2522*** (0.0415)	0.2640*** (0.0390)	(0.0064) 0.0283 (0.0503)
<i>First-stage estimation with FID as the dependent variable</i>						
Instrument (spatial FID)	0.0615*** (0.0146)	0.0579*** (0.0162)	0.0349*** (0.0115)	0.2192*** (0.0870)	0.0553*** (0.0154)	0.3701*** (0.0990)
Standard control	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Estimation statistics</i>						
Kleibergen and Paap test	22.6047* **	44.8180* **	21.6331* **	22.2097* **	22.2799* **	21.1225* **
Endogeneity test (p)	0.0012	0.0123	0.0032	0.0425	0.0102	0.0474
Obs.	890	890	850	890	889	848

Note: The figures in brackets represent robust standard errors. ***, **, *, * indicate significance at confidence levels of 1%, 5% and 10%.

Conclusion

This study examines the effect of financial institution development on manufacturing value added in sub-Saharan Africa using a dynamic panel model estimated by System GMM. The results highlight a positive and significant effect of financial development on industrialisation, validating hypothesis H1. The multidimensional analysis also confirms that its various components contribute to industrialisation, with financial depth being the most significant, followed by accessibility and efficiency, thereby supporting hypothesis H2.

Furthermore, the mediation analysis shows that this effect is partly mediated through private investment and total factor productivity, confirming hypothesis H3 and the role of the financial system in the efficient allocation of resources. Finally, the robustness of the results, verified using alternative fixed-effects estimates with instrumental variables (FE-2SLS), reinforces the validity of the conclusions.

In terms of economic policy implications, these results suggest that development strategies in sub-Saharan Africa should give greater priority to strengthening financial institutions. This implies not only deepening the financial system, but also improving its accessibility and efficiency, in order to sustainably support productive investment and industrial growth.

Finally, this study has certain limitations, notably related to data availability and the choice of instruments. Future research could explore other transmission channels, incorporate more granular institutional indicators, or adopt microeconomic approaches to better understand the underlying mechanisms.

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Appendices

Box 1 : Construction of the “Financial Institutions” Component

The “financial institutions” component of the financial development index is constructed following the methodology of Svirydzenka (2016), which aims to measure the level of development of banking intermediaries through three complementary dimensions: depth, access, and efficiency of the financial system.

Financial depth is captured using indicators such as private sector credit as a percentage of GDP, commercial bank assets relative to GDP, and broad money (M2 as a percentage of GDP). These variables reflect the capacity of the banking system to mobilise and allocate financial resources to the productive economy.

Access to financial services is measured through indicators of financial inclusion, notably the number of bank accounts per adult and, where data are available, banking branch density (number of branches per 100,000 adults). This dimension assesses the extent to which economic agents are integrated into the formal financial system.

Financial efficiency is proxied by banking intermediation indicators such as the credit-to-deposit ratio, net interest margin, and, when available, overhead costs of financial institutions. These variables reflect the ability of banks to efficiently transform deposits into credit while minimising intermediation costs.

The construction of this component follows a three-step procedure. First, all variables are normalised on a common scale to ensure comparability. Second, the standardised variables are aggregated using simple averages within each sub-dimension (depth, access, efficiency). Finally, the three sub-indices are combined with equal weights to obtain the overall financial institutions index.

The resulting index ranges between 0 and 1, where higher values indicate a more developed, accessible, and efficient banking system, which is therefore more capable of supporting productive investment and the industrialisation process.

Table A1: List of countries

Angola	Ethiopia	Niger
Benin	Gabon	Nigeria
Botswana	Gambia,	Rwanda
Burkina Faso	Guinea	São Tomé and Príncipe
Burundi	Guinea-Bissau	Senegal
Cape Verde	Kenya	Seychelles
Cameroon	Lesotho,	Sierra Leone
Central African Republic	Liberia	South Africa
Chad	Madagascar	Sudan
Democratic Republic of the Congo	Malawi	Tanzania
Republic of the Congo	Mali	Togo
Ivory Coast	Mauritania	Uganda
Equatorial Guinea,	Mauritius	Zambia
Eritrea	Mozambique	
Eswatini	Namibia	

Table A2: Definitions and sources of variables

Variables	Short definition	Long definition	Sources
MVA	Manufacturing value added	The manufacturing sector comprises industries classified in Division C of the ISIC (Rev. 3) and is defined as the physical or chemical	WDI, World Bank

		transformation of raw materials or components into new products. Value added corresponds to the contribution to the economy made by a producer, an industry or an institutional sector. It is estimated by subtracting the total value of output from the total value of intermediate consumption of goods and services required for production. This indicator is expressed as a percentage of gross domestic product (GDP), which represents the total income derived from the production of goods and services within a given economic territory over an accounting period.	
FI	Financial Institution Development Index	Financial institution development comprises: the depth of financial institutions, access to financial institutions and the efficiency of financial institutions,	IMF
FID	Financial Institution Depth	The Financial Institution Depth Index (FID) compiles data on bank credit to the private sector as a percentage of GDP, pension fund assets relative to GDP, mutual fund assets relative to GDP, and life and non-life insurance premiums relative to GDP.	IMF
FIA	Access to Financial Institutions	The Financial Institutions Access Index (FIA) compiles data on the number of bank branches and ATMs per 100,000 adults.	IMF
FIE	Financial Institution Efficiency	The Financial Institution Efficiency Index (FIE) compiles data on the banking sector's net interest margin, the loan-to-deposit ratio, non-interest income as a proportion of total income, overheads as a proportion of total assets, return on assets and return on equity.	IMF
GDP per capita	Gross Domestic Product per capita	Gross domestic product corresponds to the total income generated by the production of goods and services within an economic territory over an accounting period. It can be measured in three different ways: using the expenditure approach, the income approach or the production approach. This key indicator has been divided by the total population to obtain a per capita estimate. This indicator is expressed in constant prices, meaning that the series has been adjusted to account for price changes over time. The base year for this adjustment is 2015. This indicator is expressed in US dollars.	WDI, World Bank
TOTRENTS	Total natural resource rent as a percentage of GDP	Total natural resource rent is the sum of oil rents, gas rents, coal rents (hard coal and soft coal), mining rents and forestry rents.	WDI, World Bank
URBAN	Urban	The urban population refers to people living in	WDI,

	population (% of total population)	urban areas as defined by national statistical institutes. The data are collected and processed by the United Nations Population Division.	World Bank
FDI	Foreign direct investment, net inflows (% of GDP)	Foreign direct investment (FDI) corresponds to net inflows of investment aimed at acquiring a lasting interest in the management (10% or more of voting rights) of an enterprise operating in an economy other than that of the investor. It comprises the sum of equity capital, reinvested earnings, other long-term capital and short-term capital, as recorded in the balance of payments. This series presents net inflows (new investments minus divestments) into the reporting economy from foreign investors and is divided by GDP.	WDI, World Bank
POLSTAB	Political stability and absence of violence	'Political stability and absence of violence/terrorism' measures the perceived risk of political instability and/or politically motivated violence, including terrorism. The estimate indicates the country's score on the aggregate indicator, expressed according to a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WDI, World Bank
Invest	Private investment (%GDP)	Gross fixed capital formation (as %GDP). Gross fixed capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	IMF
Productivity	Productivity	Productivity as measured by GDP per person employed is gross domestic product (GDP) divided by total employment in the economy	WDI



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