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Does the interaction of fintech with socio-economic conditions influence the industrial transformation process in africa?

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ABSTRACT
The objective of this article is to assess the interaction effect of Fintech with socioeconomic conditions on industrial transformation in Africa. Theoretically, there is unanimity among authors on the merits of financial technologies for industrialization, but empirically, the results are mixed because they depend on economic policy and the quality of institutions. The estimation of the basic model was made possible by the Driscoll-Kraay and Lewbel methods. It appears that socioeconomic conditions have positive effects on industrialization in Africa. In addition, financial technologies, through their interaction with socioeconomic conditions, significantly stimulate industrial transformation in Africa. Therefore, the public authorities of African countries must put in place quality institutions to truly create a business climate conducive to the emergence of industry in Africa.

Contribution/Originality: This study uniquely integrates socio-economic conditions as a critical factor influencing fintech's impact on industrial transformation in Africa, contrasting with prior research that often overlooked this interaction. It employs advanced econometric methods to provide a comprehensive analysis of fintech's role in enhancing industrialization across diverse African contexts.

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1. BACKGROUND
Over the past decade, the trend towards digital transformation has been particularly notable in Africa, where the success of financial technologies, or fintech, is growing noticeably. The emergence of fintech has made it possible to provide financial services to millions of people, some of whom were previously excluded from the traditional banking system (Demirgüç-Kunt & Klapper, 2012). Thus, in the context of the economies of developing countries, characterized by low industrialization, we can see an attempt to take advantage of new trends to accelerate the industrialization process and reduce dependence on raw materials (Leridon, 2020). Theoretically, the rise of industrialization can be facilitated by modern financial systems to stimulate economic growth (Levine, 2005). According to the theory of financial intermediation, financial institutions, through fintech, help to channel savings and potentially make productive investments more accessible and less costly for industrial installations (Beck, Demirgüç-Kunt, & Levine, 2009). Furthermore, the theory of financial instability informs us of the risks associated with the rapid adoption of new financial technologies in countries where regulation is still flexible (Minsky, 1986). Empirical studies have produced

mixed results regarding the effects of fintech on industrialization. Among them, Ozili's (2018) study shows that fintech has a significant effect on financial inclusion, although its effects are limited on industrial production. However, Suri and Jack's (2016) research suggests that fintech innovations have improved the allocative efficiency of financial resources, stimulating inclusive growth in manufacturing sectors. According to Beck and Cull (2014), persistent institutional barriers and uneven technology penetration hamper the transformative potential of fintech on industrialization in developing countries.

Although Africa is often cited as an example of how fintech can transform emerging economies, its specific impact on industrialization remains an open question. How does fintech, by interacting with dynamic socioeconomic conditions, influence industrialization in Africa? The underlying hypothesis is that fintech, depending on the socioeconomic context, could play a crucial role in financing industrial small and medium-sized enterprises (SMEs) while creating new business models more adapted to local realities. However, the extent and nature of this impact are not yet well documented, which justifies the present study. Indeed, platforms such as M-Pesa in Kenya have revolutionized financial services, facilitating access to credit and savings for millions of people (Suri & Jack, 2016). The rise of crowdfunding and peer-to-peer lending has enabled African entrepreneurs to circumvent traditional barriers to financing, thereby fostering the emergence of new industrial companies (World Health Organization & World Bank Group, 2018). However, these advances are not uniform across the continent: some countries, such as Nigeria and South Africa, have seen faster development of their fintech ecosystems, while others remain behind (Gupta & Mirchandani, 2020).

Fintech, or financial technology, refers to the set of technological innovations applied to financial services. In Africa, fintech has emerged as a vector of economic transformation, influencing various sectors, including industrialization. Extensive research has identified the main factors that have contributed to the historical importance of manufacturing in the economic progress of today's middle- and high-income countries. These factors include high productivity potential due to technological advances, increasing returns to scale, and the ability to commercialize manufactured products (Beck, 2020; Ozili, 2018). Unlike previous work, this study takes into account socioeconomic conditions in assessing fintech innovations on industrialization in Africa.

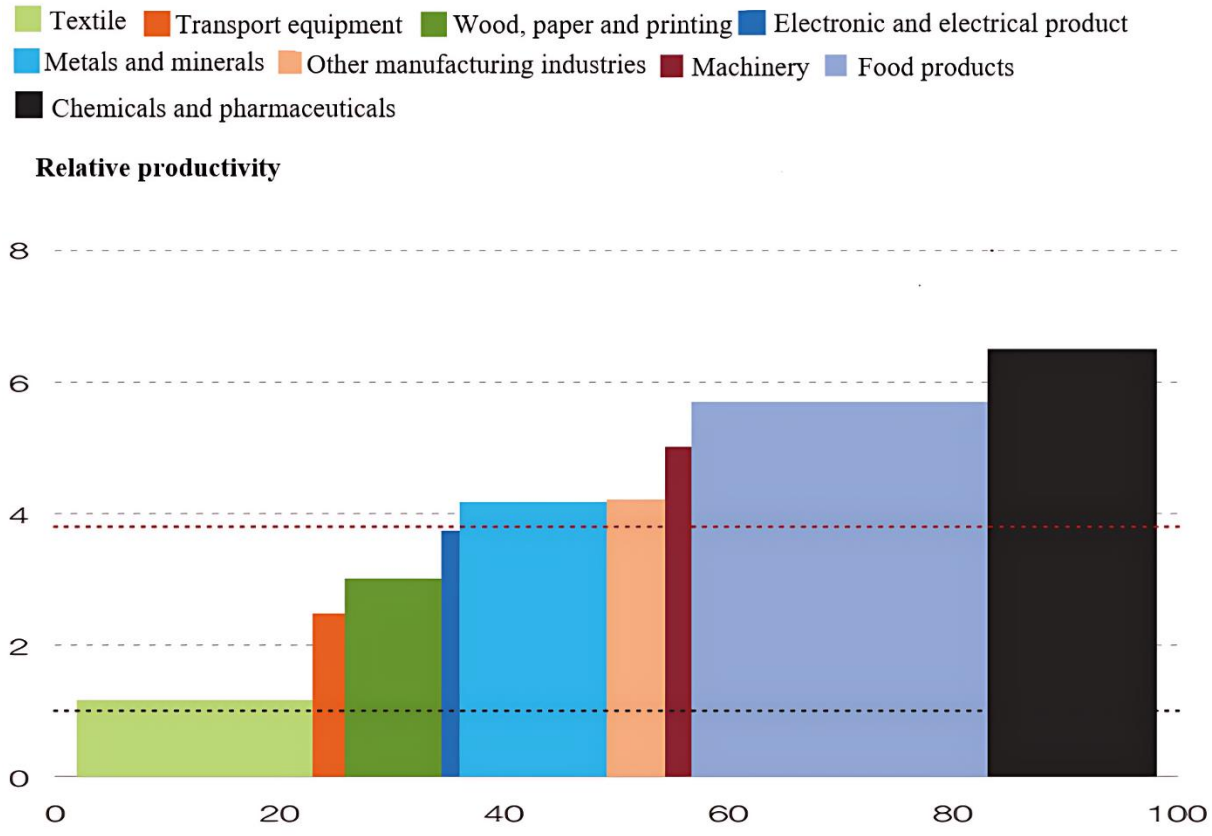

Figure 1. Economic transformation evolution of manufacturing in Africa.

Source: Calculations made by world bank services from the database on economic transformation and its database, Double-digit manufacturing data.

In order to overcome the lack of access to banking services, which affects more than half of the adult population, SMEs are taking advantage of fintech innovations to easily supply themselves and reach their customers in an environment where nearly 90% of transactions are made in cash (Wade, 2023). However, Figure 1 shows low productivity ranging from 1% to 6.5% in manufacturing in Africa, despite the importance placed on industrialization for economic development. Additionally, recent statistics provided by Figure 2 between 2010 and 2022 show the low evolution of manufacturing value added in this area. In fact, it fluctuates between 9% and 12% during the aforementioned period.

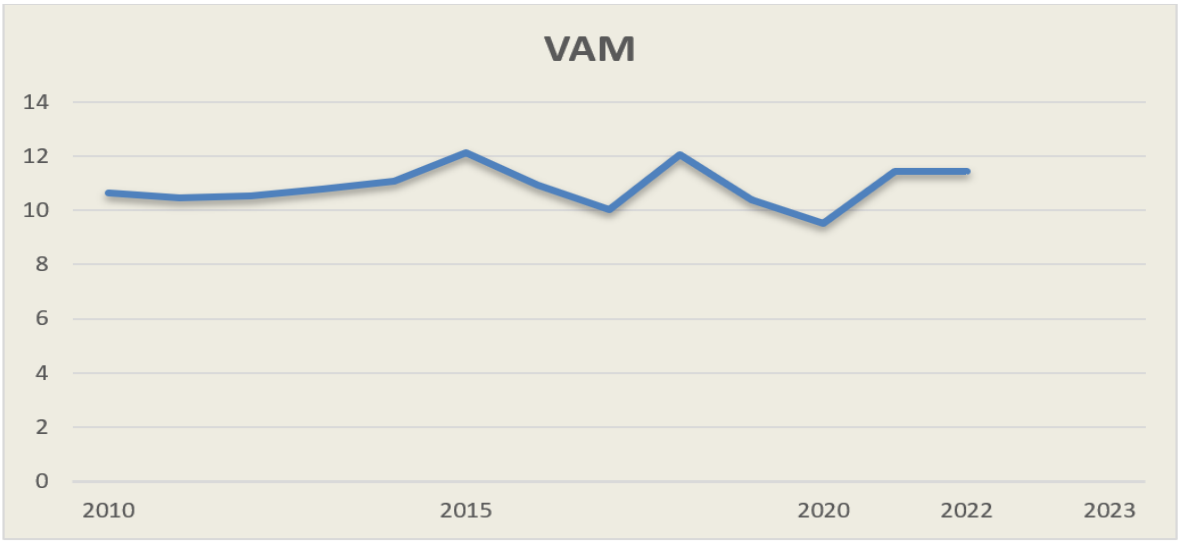

Figure 2. Evolution of industrialization in Africa.

Note: VAM is value added of manufacturing sector.
Blue line indicates the progression of manufacturing industry from 2010 to 2023.

Figure 3 shows that the rate of propagation of fintech through the mobile money service is constantly evolving in Africa over the period from 2010 to 2022.

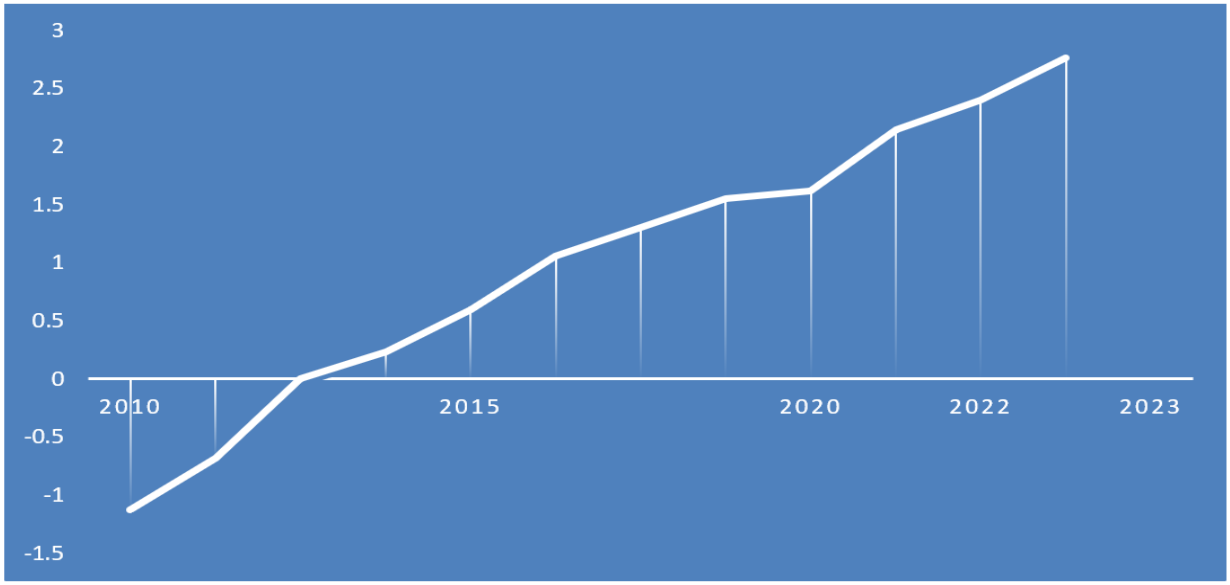

Figure 3. Evolution of fintech illustrated by mobile money in Africa.

Figures 1, 2, and 3 show contrasting developments. In fact, fintech and industrialization have not always evolved in the same direction in Africa. Our aim is to see to what extent socio-economic conditions regulate the relationship between the two concepts in the African context.

2. LITERATURE REVIEW

2.1. Theoretical Foundations

Three essential theories highlight the role of fintech in the industrialization process, such as technological innovation, transaction costs, and market efficiency.

2.1.1. Theory of Technological Innovation

According to Schumpeter (2003), fintech innovations can stimulate industrialization by introducing new methods of production and financing. Thus, the introduction of fintech can pave the way for new industries and improve industrial efficiency. The theory of Lundvall, Dosi, and Freeman (1988) emphasizes the importance of national innovation systems. Fintech, as a component of the innovation system, can promote the diffusion of new industrial technologies and improve the innovation capabilities of African firms. According to Rostow (1959), economies go through different stages of development, including a precondition phase for industrial take-off. Fintech can accelerate this transition by providing modern financial tools that support investment and industrial growth. Fintech facilitates access to credit and savings, thereby encouraging the accumulation of capital necessary for industrialization.

2.1.2. Transaction Cost Theory

Transaction cost theory, developed by Coase (1993), suggests that economic transactions incur costs related to information search, negotiation, and contract enforcement. Fintech can reduce these costs by automating and simplifying these processes. Williamson (1989) extended transaction cost theory by analyzing how governance structures and institutional arrangements can minimize transaction costs. Fintech platforms offer efficient governance solutions, thereby reducing the costs associated with economic transactions. For Akerlof (1978), information asymmetry, where one party has more information than the other, can increase transaction costs due to distrust and uncertainty. Fintechs, through transparency and traceability of transactions, can reduce this asymmetry. Furthermore, Spence's (1978) signaling theory shows that the use of fintechs helps verify information and establish trust, which reduces transaction costs associated with information asymmetries.

2.1.3. Theory of Market Efficiency

Fama and French (2015) efficient market theory states that markets where information is quickly and fully reflected in asset prices have lower transaction costs. Fintech improves market efficiency by providing real-time information and facilitating transactions. The theoretical foundations show that fintech plays a crucial role in the industrialization process in Africa. By improving access to finance, reducing operational costs, and integrating markets, fintech supports industrial growth. The case studies will illustrate how fintech innovations can transform the economies of developing countries and accelerate their industrialization.

2.2. Empirical Investigations of the Effects of Fintech on Industrialization

Recent studies in the field of the impact of FinTech on industrialization highlight several key developments and techniques. Fambeu and Yomi (2023) analyze data from World Bank enterprise surveys in 42 African countries, using probit models to compare the effects of information and communication technologies (ICTs) on firms' exports in different regions of Africa. They conclude that information and communication technologies (ICTs) positively influence the export decisions of firms in Central Africa, although this effect is less pronounced compared to other African regions. This suggests that while ICTs, a component of FinTech, facilitate market access, their impact varies regionally in Africa. Ouinsou and Chabossou (2021) use a dynamic panel model and apply the system generalized method of moments (System GMM) to estimate the specified model, using data from the World Development Indicators (WDI) and the World Governance Indicators (WGI) of the World Bank covering the period 1991-2018. The results reveal that information and communication technologies (ICTs) play a crucial role in the industrialization of Sub-Saharan African countries..

Furthermore, Tsambou and Kamga (2021) apply a methodology composed of two blocks of recursive structural equations, estimated using bivariate Probit methods and two-way least squares, to microdata from 1,897 firms in Cameroon, Côte d'Ivoire, and Senegal. They conclude that the simultaneous adoption of technological and non-technological innovations has a significant impact on firm productivity, demonstrating that these innovations are complementary. Nguekeng and Nkouli (2020) use fixed effects panel estimators after performing a Hausman test to study the effects of institutional arrangements in the franc zone on African industrialization. Institutional arrangements such as credit to the economy positively influence industrialization in franc zone countries, while inflation has an inverse effect. Kedir and Kouame (2022) implement how FinTech could improve women's career choices in Africa by linking financial technology to entrepreneurship and self-employment, particularly among marginalized groups. This indicates that FinTech plays a crucial role in improving financial inclusion and supporting gender-responsive economic opportunities. To analyze how FinTech affects bank financing and economic growth in Sub-Saharan Africa, Mashamba and Gani (2023) use covariance-based structural equation modeling to examine the impact of FinTech on bank financing and economic growth in Sub-Saharan Africa, analyzing data from 56 banks in 19 economies from 2010 to 2020. They find that while FinTech has increased banks' equity financing, it has had limited effects on economic growth due to its small size within the financial system. This highlights the potential and limitations of FinTech to transform the broader economic landscape.

Furthermore, the development of mobile money has significantly influenced the demand for money, thereby transforming the supply of financial services (Mvogo, 2020). These developments suggest that, despite some challenges, innovation and financial technologies are playing an increasingly important role in the industrialization and economic transformation of Sub-Saharan Africa. Djoufouet and Pondie (2022) demonstrate that FinTech contributes significantly to financial inclusion in Sub-Saharan Africa, where a 1% increase in mobile phone usage is correlated with a 0.67% increase in financial inclusion rates. This highlights the critical role of mobile technology in expanding access to financial services. Langley and Leyshon (2022) explore the expansion of Africa's FinTech economy through platform capitalism, highlighting how these platforms are reshaping financial relations and potentially altering colonial relations through digital and data infrastructures.

It follows from the above that most of these studies have shown that different measures of FinTech, such as technological innovations and mobile services, have effects on industrialization, also considering the institutional framework as an essential determinant of industrialization in developing countries. The particularity of our study is that we construct a synthetic indicator for FinTech measurement.

3. SPECIFICATION OF THE MODEL, PRESENTATION OF THE VARIABLES, AND THE ESTIMATION TECHNIQUE

3.1. Econometric Specification of the Model

Our assessment of the interaction effects of fintech with socioeconomic conditions on industrialization in Africa draws on the work of Mashamba and Gani (2023). The formulation of the econometric model is expressed in the following implicit form:

$$Indust = f(Fintech, Z) \quad (1)$$

The term 'Indust' corresponds to the industrialization variable, while 'Fintech' is our variable of interest, and 'Z' represents the vector of control variables. This analysis is inspired by the model of Kasali et al. (2019), which examines the effect of financial innovation on the industrialization process in Nigeria. We adopt the following dynamic model:

$$Indust_{it} = \beta_0 + \beta_1 Indust_{it-1} + \beta_2 (Fintech * SocioEconomic)_{it} + \beta_3 Z_{it} + \mu_i + v_t + \varepsilon_{it} \quad (2)$$

$Indust_{it}$ represents the industrialization variable measured by the added value of the secondary or manufacturing sector (Avom, Nkengfack, Fotio, & Totouom, 2020). $Fintech_{it}$ represents the variable of interest, which is the synthetic index of fintech; *Zit* is the vector of control variables; μi is the effect specific fixed or random of country *i*, v_t refers to the temporal effect and εit represents the error term with i = 1,2, 3....N and t = 1,2, 3…T. $\beta 0$, $\beta 1$, $\beta 2$ represent the model parameters.

3.2. Presentation and Justification of Variables

To analyze the effect of fintech on industrialization in Africa, we use panel data with a sample of 33 countries over a period from 2010 to 2022. We first present the main variables and, secondly, the control variables. In these studies, we distinguish three categories of variables, namely: the dependent variable (industrialization), the variable of interest (fintech), and control variables (trade openness, human capital, foreign direct investment, and socioeconomic conditions). We will address each of these variables one after the other.

Industrialization: This is our dependent variable measured by the ratio of manufacturing value added to Gross Domestic Product (GDP), which captures the capacity to transform natural resources into final goods and the relative share of employment in the industrial sector (Avom & Nguekeng, 2019).

Fintech: This is our variable of interest measured by a composite index reflecting the development of fintech infrastructures such as mobile money, Information and Communication Technologies (ICT), World Telecommunication/ICT Indicators Database, and technological innovation (https://data.uis.unesco.org).

Table 1. Eigenvalues of principal component analysis (PCA)

Components	Eigenvalues	Difference	Proportion	Cumulative
Comp1	1.8702	0.641	0.452	0.623
Comp2	1.229	0.190	0.297	0.900
Comp3	1.039	/	0.251	1
Sphericity test (Chi^2)	339.230***	521.101***	218.463***	1078.794***

Note: *** indicates the 1% significance level.

It is clear from Table 1 that all three components better explain the fintech phenomenon. In fact, they all have eigenvalues greater than 1 and can therefore be used to construct the Principal Component Analysis (PCA). Among them, mobile money has a higher proportion than the other two. In addition, Bartlett's test of sphericity has a high value compared to the value read on the chi-square statistical table at the 1% threshold; hence, the reliability of the index. To assess the contribution of each variable retained in the construction of the index, we determine the eigenvalues of each variable, given that they all have eigenvalues greater than 1, as indicated in Table 2.

Table 2. Summary of PCA results.

Variable	Comp1	Unexplained
Mobile money	0.625	0.375
ICT	0.659	0.341
Innovation technology	0.620	0.380

Note: Factorial charges > 0.30 are bold.

Furthermore, all these variables (mobile money, ICT, and innovative technology) were taken into consideration for the creation of the index; none were excluded. In fact, they all have a factor index greater than 0.30.

3.3. Control Variables

GDP: It is measured by the growth rate of GDP per capita (Albeaik, Kaltenberg, Alsaleh, & Hidalgo, 2017). It is a variable used to compare levels of development between different countries (Rodrik, 2013). The expected effect, according to the empirical literature, is a positive sign.

Trade Openness: It is measured by the sum of exports and imports of goods and services reported to GDP (Baltagi, Demetriades, & Law, 2009). Indeed, according to Mignamissi and Nguekeng (2022), among the determinants of industrialization, priority must be given to trade openness, which is one of the keys to Africa's development.

Human Capital: Human capital can have a significant influence on production in that it allows for improved labor productivity. Furthermore, it enables adaptation to new technologies (Romer, 1986), which is favorable to industrialization. The choice of this variable is inspired by the work of Squicciarini and Voigtländer (2015).

Socioeconomic conditions: The economic environment is crucial for fostering industrialization in a country (Ewango-Chatelet & Estay, 2022).

Foreign Direct Investment (FDI): Inward FDI stimulates local industrial activities simply by its presence in domestic markets.

3.4. Presentation of the Estimation Technique

The objective of this chapter is to analyze the interaction effect of socioeconomic conditions with fintech on industrialization. We used panel data that integrates the individual and temporal dimensions. For a basic analysis, our first estimations use the Driscoll-Kraay and Lewbel methods. Corrections for cross-sectional dependence are better handled by the Driscoll-Kraay technique (Kouladoum, 2023; Nchofoung & Asongu, 2022). In addition, the problem of models subject to endogeneity is better addressed by Lewbel (2012).

4. PRESENTATION OF RESULTS AND INTERPRETATION

4.1. Preliminary Test Results

To avoid spurious regression (Nchofoung, Fotio, & Miamo, 2023), we performed the Im-Pesaran-Shin and Levin-Lin-Chu stationarity test. It shows that all the variables raised in the analysis are stationary at the level.

To avoid spurious regression (Nchofoung et al., 2023), we performed the Im-Pesaran-Shin and Levin-Lin-Chu stationarity tests. They show that all the variables raised in the analysis are stationary at the level. Table 3 presents the Pesaran (2021) and Breusch-Pagan heteroscedasticity tests, respectively. The Pesaran test indicates the presence of cross-sectional dependence, as the probabilities are less than 5%. In addition, the Breusch-Pagan heteroscedasticity test (Table 4) indicates that all probabilities are less than 5%, justifying the presence of endogeneity and heteroscedasticity problems. For this purpose, it is useful to use the Driscoll-Kraay estimation method and the Lewbel method to avoid bias and correct the endogeneity problem.

Table 3. Pesaran test (2015, 2021).

Variable test	1	2	3	4	5	6
CD-test	1.15	0.61	0.64	1.33	0.11	0.15
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 4. Breusch - Pagan heteroscedasticity test.

Variable test	1	2	3	4	5	6
χ^2 (Chi-square)	8.74	4.00	5.07	4.68	3.82	4.24
Probability	0.0032	0.0000	0.0018	0.0010	0.0021	0.0004

4.2. Estimation of Results

In this subsection, we present the basic results obtained by the Driscoll-Kraay and Lewbel methods.

Table 5. Driscoll–Kraay estimate.

Method of estimation Driscoll-Kraay					
Dependent variable: Industrialization					
Independent variables	**1**	**2**	**3**	**4**	**5**
Fintech	0.134** (0.051)	0.232*** (0.062)	0.230*** (0.063)	0.236*** (0.064)	0.569** (0.047)
Human capital		0.216** (0.083)	0.214** (0.084)	0.251** (0.088)	0.195** (0.088)
Foreign direct inves			-0.058*** (0.003)	-0.037*** (0.0012)	-0.049** (0.012)
Openness				0.051*** (0.010)	0.059*** (0.003)
GDP					0.020 (0.001)
SocioEconomic					-0.095** (0.016)
Fintech*SocioEconomic					0.088*** (0.013)
Constant	2.370*** (0.052)	1.029* (0.519)	1.048* (0.530)	1.465** (0.585)	1.453** (0.586)
Observations	86	86	86	80	80
R-squared	0.076	0.145	0.146	0.186	0.195

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Estimation Lewbel.

Estimation method: Lewbel					
Dependant variable: Industrialisation					
Independent variables	**1**	**2**	**3**	**4**	**5**
Fintech	0.1347**	0.232***	0.230***	0.236***	0.169**
	(0.025)	(0.016)	(0.018)	(0.016)	(0.029)
HumanCapital		0.215***	0.214***	0.200***	0.195***
		(0.016)	(0.017)	(0.020)	(0.026)
ForeignDirectInvest			-0.082**	-0.068**	-0.087***
			(0.018)	(0.021)	(0.015)
Openess				0.051***	0.049***
				(0.0024)	(0.0034)
GDP					0.0233***
					(0.0023)
SocioEconomic					-0.026***
					(0.0052)
Fintech*SocioEconomic					0.048***
					(0.0019)
Constant	2.370***	1.029***	1.048***	1.465***	1.453**
	(0.023)	(0.112)	(0.125)	(0.209)	(0.255)
Observations	86	86	86	80	80
R-squared	0.476	0.545	0.546	0.586	0.595

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

In view of Tables 5 and 6, two main observations can be made. First, fintech has a positive and significant effect at the 5% threshold on industrialization, measured by the ratio of manufacturing value added to GDP. Indeed, all else being equal, an increase of one unit in fintech leads to an increase in the share of manufacturing value added in GDP of 0.169 units. This result, in line with the work of Fambeu and Yomi (2023), suggests that by allowing companies access to new technologies such as artificial intelligence, fintech stimulates industrialization in Africa. In addition, fintech facilitates companies' access to the funds they need while mitigating the risks associated with market uncertainty and volatility (Mashamba & Gani, 2023).

The interaction of fintech with socioeconomic conditions reinforces this result. In fact, institutional arrangements such as the business environment and state regulation contribute to the acceleration of industrial transformation in Africa. The work of Ouinsou and Chabossou (2021) and Nguekeng and Nkouli (2020) points in the same direction.

Furthermore, FDI does not have a significantly beneficial effect on industrial development in Africa. This negative and significant contribution of FDI in Africa is explained by the low transfer of technology and know-how. Additionally, the low proportion of the manufacturing value-added contribution of multinational companies operating mainly in extraction (Fowowe & Folarin, 2019; Nkoa, 2016; World Bank Group, 2014) is noteworthy. Trade openness statistically and significantly improves industrialization through the acquisition and use of new technologies in Africa (Iddrisu & Alagidede, 2020; Iwegbu, Justine, & Borges Cardoso, 2022). Similarly, increasing the GDP growth rate accelerates industrial development in Africa (Iwegbu et al., 2022).

4.3. Robustness Analysis: Approach by the MMG Method in System and Kinkyreg

In order to test the sensitivity of our results, we conduct a robustness analysis. For this purpose, we use two other estimation techniques, namely the system GMM and Kinkyreg, while considering the employment rate in the industrial sector as our dependent variable. Tables 6 and 7 are stable; in other words, we arrive at the same conclusions. Fintech and its interaction with socioeconomic conditions significantly stimulate industrialization in Africa. This result can also be explained by the fact that socioeconomic conditions constitute one of the pillars of sustainable structural transformation. These results are in line with the work of Jong-A-Pin (2009) as well as Aisen and Veiga (2013).

Table 7. Estimation using GLS (Generalized Least Squares).

System MMG								
Dependent variable: Ratio of real GDP to industrial employment.								
Independent variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Indust$_{t-1}$	0.092*** (0.002)	0.084*** (0.002)	0.073** (0.002)	0.064*** (0.062)	0.058* (0.023)	0.057** (0.049)	0.056*** (0.010)	0.048*** (0.001)
Fintech	0.134*** (0.050)	0.232*** (0.061)	0.231*** (0.061)	0.235*** (0.062)	0.169* (0.093)	0.261*** (0.095)	0.364*** (0.031)	0.287*** (0.010)
Human capital		0.215*** (0.081)	0.213*** (0.082)	0.200** (0.085)	0.194** (0.085)	0.154* (0.082)	0.155* (0.083)	0.165** (0.082)
Foreign direct investment			-0.018*** (0.008)	-0.047*** (0.011)	-0.049** (0.011)	-0.068*** (0.010)	-0.066*** (0.010)	-0.082*** (0.010)
Openness				0.051** (0.025)	0.059** (0.027)	0.064** (0.027)	0.034** (0.029)	0.040** (0.029)
GDP					0.055** (0.006)	0.074*** (0.012)	0.097** (0.021)	0.077*** (0.012)
SocioEconomic							-0.099** (0.015)	-0.048** (0.016)
SocioEconomic*Fintech								0.496*** (0.019)
Constant	2.370*** (0.051)	1.029** (0.510)	1.048** (0.518)	1.465*** (0.566)	1.453*** (0.564)	1.418*** (0.538)	1.414*** (0.542)	1.320** (0.541)
Observations	86	86	86	80	80	80	80	80
Number of id	30	30	30	28	28	28	28	28

Note: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Estimation Kinkyreg.

Variables	**Kinkyreg**							
Dependent variable: Ratio of real GDP to industrial employment.								
Independent variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Fintech	0.248***	0.406***	0.404***	0.405***	0.565***	0.716***	0.816***	0.829***
	(0.052)	(0.066)	(0.075)	(0.082)	(0.173)	(0.188)	(0.217)	(0.219)
Human capital		0.343***	0.340***	0.334***	0.360***	0.306***	0.329***	0.337***
		(0.086)	(0.091)	(0.100)	(0.113)	(0.105)	(0.110)	(0.111)
Foreign direct investment			-0.080**	-0.087**	-0.070***	-0.071***	-0.076***	-0.060***
			(0.024)	(0.032)	(0.020)	(0.021)	(0.022)	(0.022)
Openness				0.058**	0.062**	0.060**	0.077**	0.052**
				(0.017)	(0.014)	(0.017)	(0.016)	(0.016)
GDP					0.072**	0.053**	0.071**	0.081**
					(0.024)	(0.024)	(0.027)	(0.022)
Socioeconomic conditions							-0.422**	-0.634**
							(0.201)	(0.311)
SocioEconomic*Fintech								0.425***
								(0.021)
Constant	2.401***	1.262**	1.294**	1.532**	1.475**	1.338**	1.638**	1.068**
	(0.052)	(0.541)	(0.576)	(0.662)	(0.511)	(0.691)	(0.732)	(0.742)
Observations	82	82	82	76	76	76	76	76

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations using Stata.

From this estimation of robustness by generalized least squares (Table 7) and the Kinkyreg technique (Table 8), it emerges that the coefficient associated with the fintech variable of interest remains positive and statistically significant at the 1% threshold when adding the control variables, thus confirming the previous analyses. In addition, the graphical representation in Figure 4 effectively confirms the positive and significant effect of fintech on industrialization, measured by the ratio of manufacturing value added to GDP in Africa.

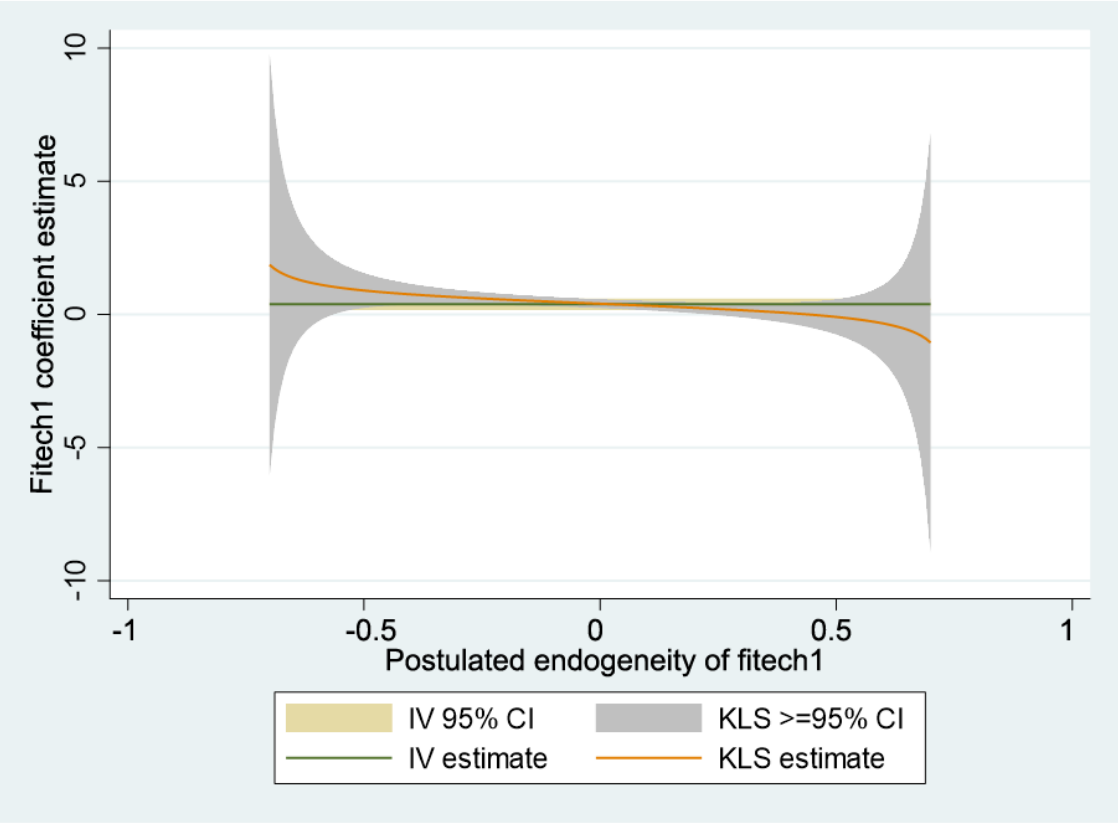

Figure 4. Kinkyreg graph.

Ultimately, the objective of this article was to assess the effects of the interaction of fintech with socioeconomic conditions on industrialization in Africa. Using the Driscoll-Kraay method and Lewbel (2012) estimation technique, we find that fintech, which improves financial inclusion through access to modern financial services, stimulates industrial development. Its effectiveness is determined by the socioeconomic context in which it operates. Indeed, socioeconomic conditions include access to the internet, the quality of infrastructure, the level of education, and political stability, which are important variables influencing the effects of fintech on industrial transformation in Africa. The results we obtained are consistent with the conclusions of Ouinsou and Chabossou (2021) and Nguekeng and Nkouli (2020). It is necessary to create an enabling environment for sustainable industrial transformation by prioritizing targeted institutional reforms. Strengthening socioeconomic foundations is the keystone to stimulating fintech to accelerate long-term industrial development.

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