The impact of SME sector on economic growth in Africa

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17 October 2024

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Abstract

Although small and medium-scale enterprises (SMEs) finance and technical support have become critical economic development strategies for many countries in Africa and numerous micro-level studies have examined their effects on firm performance, evidence of how SMEs impact economic growth and the causal pathways remains mixed and largely debatable. Based on different strands of the literature, this study hypothesises a nonlinear relationship between SMEs and economic growth. Regressing growth on SME data as measured by the number of newly registered businesses in 40 African countries from 2006 to 2022, we find support for a nonlinear relation of an inverted U-shape. The results suggest that African countries may pursue policies aimed at boosting SME support as a tool for macro-level development. However, the transient effects of SMEs also suggest the need to consider strategies to ensure that its effects remain positive and sustainable over the long run. While policymakers could consider country-specific studies to understand and design innovative strategies to support the SME sector, more research is required on the types of SMEs and the conditions under which they may influence growth in Africa.

Keywords: Small and medium size enterprises, SMEs, entrepreneurship, economic growth

1. Introduction

Africa hosts one of the youngest and fastest growing populations and offers numerous opportunities for inclusive growth through its rich natural and abundant human resources, expanding cities, and innovations. Despite facing significant challenges over the past two decades, it experienced uneven but notable growth, averaging 5.1% from 2000-2010 before downshifting to 3.3% from 2010 to 2019 (Kuyoro et al., 2023). Many factors are offered to explain these leaps and slowdowns in growth, amongst which entrepreneurship is a typical reason (Nickell, 1996; Baumol, 1990). Estimates by the International Finance Cooperation suggest that SMEs constitute more than 90% of businesses in Africa and account for around 80% of all jobs created (Runde et al., 2021). Therefore, flourishing businesses can spearhead unprecedented economic expansions, while a slowdown in growth may be partly affected by a decline in SMEs.

While the neoclassical and endogenous growth models identify investment in physical and knowledge capital as vital ingredients for economic growth (Solow, 1956, Romer, 1986, Lucas, 1988), the important role of SMEs in accelerating economic activities and social welfare is also widely recognised in leading theories (Nickell, 1996; Baumol, 1990; Holmes & Schmitz 1990; Schumpeter, 1934). Empirical studies have documented considerable evidence of a strong correlation between SMEs and growth over the past recent decades compared to a greater part of the 20th century when large firms played a more prominent role in economies. Accordingly, SMEs accelerate innovation, create jobs, and curb poverty, proving time and again that they are critical for economic prosperity (Geroski, 1989, Callejon & Segarra, 1999; Cumming et al., 2014). In spite of the copious literature, the nature of the SMEs-growth nexus remains mixed and debatable. Some studies have found an inverse relationship (Foster et al., 2006; Baldwin, 1998), some have found mixed and inconclusive results (Mueller et al., 2008; Carree, 2002b), while others have shown that it diminishes over time (Scherer, 1991). Due to these ambiguities, Van Stel et al. (2019) and Erken et al. (2018) conjectured that the relationship between SMEs and growth might be dynamic, while Van Stel and Storey (2004), Fritsch and Mueller (2004), Fritsch (2013), Faria et al. (2010), and Memili et al (2015) argued that it may follow a nonlinear pattern over time.

Although the last two decades have witnessed a wealth of these studies analysing the theoretical and empirical determinants of SMEs, and its consequences on economic growth, they have been largely restricted to firm and regional level analyses. In sum, there is a general paucity of research on the effects of SMEs on growth at national and regional levels in Africa as a significant number of them focus on exploring the experiences of developed economies in North America and Europe. While some have considered the SMES-growth nexus in developing countries (Ayyagari

et al., 2014), some of the findings suggest that their impact may be limited in developing countries, where necessity-driven entrepreneurship is more predominant (Wong et al., 2005; Acs, 2006). SMEs might promote competition, innovation and growth, but excessive growth of the sector could lead to congestion and inefficiency or diminishing returns setting in after certain threshold (Acs, 2006; Romer, 1986). Additionally, many people in developing countries might start SMEs because they lack paid jobs and abandon them as soon as the opportunities arise. Therefore, the initial increase in SMEs may have a positive impact on growth, but beyond a certain threshold, further increases could exhibit negative effects. This leads us to the hypothesis of our study:

H_1: There is a nonlinear, inverted *U*-shaped relationship between SMEs and economic growth in Africa

Some studies have also linked the effectiveness of SMEs to the different types of legal systems, geographic location, and level of economic development (Wong et al., 2005; Acs, 2006; Audretsch & Dohse, 2007). La Porta et al (1998) found that common law systems- relative to civil law systems- gave investors superior rights and tended to promote small business ownership. Levine (1999) found that the legal and regulatory environment influenced financial intermediary development. If financial intermediation improves due to the legal environment of common law countries, then the impact of SMEs on growth can become positive. While Audretsch and Dohse (2007) have found evidence that the location of firms also makes a difference in their performance, it is possible for SMEs in different locations to have differential effects on economic growth. Therefore, we further split our data into these sub-samples to verify whether the preceding hypothesis hold.

Our contribution to the literature is threefold. Firstly, we consider a larger number of countries relative to any previous study with the most recent and complete dataset to examine how the presence and growth of SMEs contribute to economic growth in Africa. Documenting evidence from the African region is crucial because more than 90% of its businesses are SMEs, but only a small percentage may grow into high-growth enterprises, especially as most of them operate in the informal sector. Additionally, many African SMEs are small family businesses with limited growth and job creation potential (Adusei, 2016). These peculiarities make it uncertain what a high level of SMEs means for economic growth over time, as the predominance of routine entrepreneurs might increase entrepreneurship capital without necessarily contributing to growth. Studies that attempted to fill this gap either employed a small sample of African countries (Adusei. 2016; Peprah & Adekoya, 2020), or were conducted at country levels (Adeosun & Shittu, 2022).

Therefore, there is a need for more in-depth studies that investigate the causal pathways and dynamics at play to provide insights to researchers, policymakers, and stakeholders looking to support the growth of the SMEs sector in the continent.

Second, studying the shape of the relationship between SMEs and growth gives insights into their possible dynamic effects over different periods. Since economic systems have complex relationships that change over time, our approach can better capture these nuances. In essence, our model captured diminishing returns of SMEs on growth. Compared to their linear counterparts, the nonlinear approach also helped us avoid model misspecification and further provided better explanatory power, which ensured accurate results and policy recommendations. To our knowledge, no previous study has been conducted on the shape of the relationship between SMEs and economic growth in Africa.

Third, we add a notch of originality by exploring the development impacts of SMEs across countries by type of legal systems, geographic location, and level of economic development, which allows for a richer analysis of heterogeneity. Firstly, landlocked countries, relative to coastal ones, are more likely to face higher transportation and trade costs, as such the development of localised markets and SMEs to meet domestic demand would substantially drive growth. Second, the linguistic and legal advantages of common law countries may facilitate easier communication with international partners, access to global networks, and the ability to adopt global best practices (Levine, 1999; La Porta et al, 1998). Finally, while SMES are typically expected to play a crucial role on economic development in both low and upper-middle-income countries, their impact might be more noticeable in low-income countries because of the higher potential for they to drive economic transformation in those regions. Taken together, these factors provide SMEs in these regions with unique opportunities to capitalise on both local and international markets, driving their growth potential. It is therefore important to disaggregate the effectiveness of SMEs to have a better understanding of the business ecosystem and its relationship with growth.

The rest of the paper is structured into five sections. The second section identifies theoretical linkages between SMEs and economic growth, and also reviews the empirical literature. The third section discusses the econometric model, data, issues of endogeneity, and estimation procedures. The fourth section presents and discusses the results from our econometric estimations. In section five, we conclude the study, pull out major policy implications, limitations, and make suggestions for further research.

2. Literature review

2.1 SMEs and economic growth: a theoretical perspective

The effects of SMEs on economic growth have attracted a profusion of theoretical work in the entrepreneurship literature over the years. Some of these theories include the endogenous (Romer, 1986; Lucas, 1988), new economic geography (Krugman, 1991), and the Schumpeter growth theories (Schumpeter, 1934). From the first theoretical perspective, the core of traditional economic theory is that growth is a function of capital accumulation and exogenous technological progress, which leaves little room for SMEs (Solow, 1956). However, endogenous growth models assume that long run growth depends on profit-seeking investment in knowledge by private agents that drives technological progress, a process that can be interpreted as an entrepreneurial activity because of the uncertainty linked to the outcome of such investments (Grossman & Helpman, 1994, p. 24). Second, the new economic geography posits that economic growth is a function of specific regional growth activities that motivate firms to cluster in particular regions, thereby fuelling local growth (Vallierea & Peterson, 2009). Krugman (1991) attributed such clustering to economies of scale, high cost of producing across large tracts of spaces, minimisation of transport cost, and other benefits that ensue from locating where there are other firms (e.g., available market), essentially rolling out the place of SMEs on growth.

Perhaps a more compelling link between SMEs and economic growth was established by Schumpeter (1934). Accordingly, economic growth depends on how an economy structures and utilises their scarce resources efficiently. While earlier studies identified centralisation and concentration of industrial structures to be most conducive for efficiency, this perspective has shifted towards more decentralised structures in recent years due in part to technological progress, globalisation, and other factors, leading to a greater role for SMEs (Carree, & Thurik, 2010). A detailed review of these theories suggests that, although SMEs tend to have a direct effect on the development of new capacities, they mostly influence economic growth via indirect channels of innovation, competition, knowledge spillovers, job creation, and supply chain linkages.

Innovation is crucial for SMEs to promote economic growth. Schumpeter (1934) identified two indirect channels through which innovations affect different sectors of the economy: dynamic entrepreneurs creating new markets and introducing competitive pressure on incumbents through lower prices and higher quality products (Cohen & Klepper 1996). This drives long-term economic growth through R&D investments that accelerate technological development and growth (Aghion and Howitt, 1992; Wennekers & Thurik, 1999). SMEs also drive economic growth by enhancing competition at both industry and aggregate levels (Nickel, 1996). At the industry level, they foster

investments in R&D, which impacts productivity growth and efficiency (Cohen & Klepper, 1996). SMEs also displace incumbent firms, forcing them to strive for higher productivity (Geroski, 1989; Baumol, 1990; Holmes & Schmitz 1990). At the aggregate level, they create new ideas, igniting competition and transforming the productive potential of the economy (Bosma, 2011; Audretsch & Fritsch, 2002; Wennekers & Thurik, 1999).

Additionally, knowledge spillover facilitated by SMEs is a powerful driver of innovation, productivity, competitiveness, and economic growth (Audretsch & Keilbach, 2008; Audretsch et al., 2006). Supply chain linkages are also crucial for SMEs to boost economic growth. SMEs create new businesses that require inputs from suppliers, providing outputs to other businesses. Lastly, SMEs create new job opportunities, driving efficiency and economic growth (Acs, 2006; Fritsch & Mueller, 2004; Schumpeter, 1934). However, it is the combined effects of both ordinary and Schumpeterian entrepreneurs that drives long term growth, and many studies with this static perspective assume that countries with more entrepreneurial activities (SMEs) are likely to possess both and experience more growth (Carree & Thurik, 2010).

2.2 Linking SMEs to economic growth: an empirical literature

After the publication of Schumpeter's (1911) theory of creative destruction, entrepreneurship did not immediately attract significant empirical scrutiny. Some pioneer studies were conducted by Birch (1979, 1981, 1987) via which the authors claimed that SMEs were generating more jobs in the U.S. economy than large enterprises. Since then, several studies have attempted to test the SMEs-growth hypothesis (Cumming et al., 2014; Mueller et al., 2008; Beck et al., 2005; van Stel et al., 2005). These studies differ according to their spatial units of observations (micro/macro), measures of SMEs, scope, type of data, and estimation procedures. In spite of these number of studies, the question of whether countries that have accelerated efforts to realise a large SMEs sector enjoy more growth remains open and crucial for policymakers. With respect to economic development, typical yardsticks include (un)employment, productivity, value added in production and GDP per capita growth (Wong et al., 2005; Fritsch & Mueller, 2004).

Earlier attempts to quantify the development impact of SMEs employed self-employment rates to measure entrepreneurial activities (Blanchflower, 2000; Carree et al., 2002a). However, van Stel et al. (2005) questioned the adequacy of this approach. While the literature has grown (Carree & Thurik, 2008; Carree et al., 2007, 2002ab; Van Stel et al., 2005), it is replete with ambiguous results, largely attributed to the different measures of SMEs and development often employed in studies. In terms of market dynamics, some studies examine the effect of entries and exits separately, while

others combine both information to study the effects of "turnover" of businesses in an industry or region. Market turbulence—i.e., the sum of entries and exits—is also frequently used, while some studies use net entry (entries minus exits).

Overall, an overwhelming majority of the studies find a positive relationship between SMEs and economic growth, although others argue that dynamic (innovative) entrepreneurs are more effective in enhancing growth than routine ones (Mueller, 2007). This growth-enhancing effects of SMEs has been observed in various countries, including the United Kingdom, OECD countries, Italy, Russia, and West Germany (Ashcroft & Love, 1996; Mueller et al., 2008; Carree & Thurik, 2008; Piergiovanni et al., 2012; Berkowitz & DeJong, 2005; Audretsch & Keilbach, 2004ab). Nonetheless, some studies have found negative effects of SMEs on growth or no effects (Baldwin, 1998; Foster, Haltiwanger & Krizan, 2006; Ayyagari, Demirguc-Kunt, & Maksimovic, 2014).

Studies have also tested whether the relationship between business ownership and economic development follow a linear, quadratic, inverse (L-shaped), or inverted U-shaped specification (Wennekers et al., 2005), consistently finding evidence in favour of a U-shaped relationship (Carree & Thurik, 2008; Fritsch & Mueller, 2004; Carree et al., 2002; Acs et al., 1994). While some argue that all effects of SMEs on economic development do not emerge immediately upon entry into the market, a cross-section of the literature has observed that these effects vary across countries and becomes stronger over time (Audretsch & Fritsch, 2002; Audretsch et al., 2002). Although many of these analyses included only short time lags between new business formation and the respective effects on outcomes, another set of the literature finds that the effects of SMEs tend to diminish over time (Fritsch, 2013; Iyigun & Owen, 1998; Yamada, 1996; Scherer, 1991). Memili et al (2015) found that the prevalence of family business had a nonlinear inverted U shaped relationship with economic growth in the USA.

In their study of how time lag structures influenced the effect of new businesses on economic development in Great Britain, Van Stel and Storey (2004) found a statistically significant effect over a 10-year period. Audretsch and Fritsch (2002) used longer time lags for the case of West Germany and established evidence of a positive long run impact of new businesses on employment change in the 1990s relative to the 1980s. Fritsch (2004), Wennekers et al. (2005), and other researchers applied even higher-order polynomials and found "wave-like" patterns of the effects of entrepreneurship on growth. These studies suggest that the effect of SMEs is typically positive in the current year, negative and significant during the first three years, positive and significant between the 6th and 9th years, and negative and statistically significant as from the 10th year. Fritsch

and Mueller (2004) attributes the positive coefficients during the first year to the additional jobs created by new SMEs. The direct employment effect is then expected to decline from the second year. Market selection is triggered in the 5th year, which coincides with the negative effect of SMEs. As from the 6th to the 10th year, employment grows, perhaps due to increased competitiveness of regional suppliers from market selection before it starts fading away after the 10th year (Fritsch, 2013).

While many of the above studies measured development with employment, SMEs also exhibit a direct effect on productivity, particularly when the innovation effect sets in. For instance, when new firms compete with incumbents for survival, an increase in the number of new firms should increase productivity, even if employment declines. The productivity effect of SMEs is generally expected to manifest soon after entry into the market, when the employment effect is being dominated by displacement of incumbents (Fritsch, 2013). Callejon and Segarra (1999), Audretsch and Keilbach (2004), Audretsch et al. (2006), Carree and Thurik (2008), and Bosma (2011) have all documented positive effects of entrepreneurial activities on productivity growth.

3. Methodology and Data

3.1 Model specification

The purpose of the study is to examine the relationship between SMEs and economic growth. To that end, we employ an augmented reduced-form multivariate regression equation from Beck et al. (2005), Wong et al (2005), Audretsch and Keilbach (2004ab), and Barro (1991). Based on the U-shaped curve discovered by Acs et al. (1994), Wennekers et al. (2005) and Carree et al. (2007), between economic growth and nascent entrepreneurship, and the diminishing effect of SMEs on growth uncovered by Scherer (1991), we test the nature of the relationship between SMEs and economic growth in Africa by using the following growth model.

$$\mathrm{GDPCg_{it}} = \alpha_0 + \beta_1 \log (SMEs)_{it} + \beta_2 \log (SMEs)_{it}^2 + \lambda_i X_{it} + \mu_i + \epsilon_{it} \qquad (1)$$

where:

$\mathrm{GDPCg_{it}}$ and $SMEs_{it}$ represent real GDP per capita growth rate and the number of newly registered businesses in a fiscal year, respectively. SMEs enter the model in linear and quadratic form as an exogenous determinant of economic growth, where their size represents a form of entrepreneurial capital in each country. X_{it} represent a set of control variables. All data are annual observations from an unbalanced panel. The subscripts i captures the country, t refers to the year, α is the constant term, β_1 is the coefficient of SMEs, β_2 is the coefficient of the quadratic variable

($SMEs^2$), λ_i are parameters to be estimated of control variables, μ_i is the country-effects, and ϵ_{it} is the idiosyncratic error term.

We begin our analysis by estimating a series of OLS regressions to select the best model. We used general to specific modelling criteria to successively eliminate control variables with the smallest t-statistics until each of the retained control variables was significant at 10% level in the full sample. We consider three main regressions to verify the hypothesised relationships. First, we consider the linear relationship between SMEs and economic growth by regressing the full sample of African countries while adding our final pool of control variables. Second, we consider the nonlinear specification. Third, we repeat the estimations after splitting our samples by type of legal system, geographic location, and by the different income groups.

To choose between the different specifications, we explored the goodness of fit from each of these specifications, and also applied the likelihood ratio test (LR-test) to choose between a simple and more superior specification of the econometric model. Results from the LR-ratio test suggested that a more complex model provides significantly better fit. Therefore, we only present results from the nonlinear specification.

3.2 Misspecification, endogeneity, and measurement issues

Eq. (1) could suffer from two potential sources of misspecifications that may bias the results. First, different industries follow different life cycles that can result in the number of entries and SMEs being relatively higher in some years if some industries are in their growth phase and lower when they are in the later phases of their life cycle. This could lead to measurement error, making it difficult to attribute a positive correlation between SMEs and growth to the size of the SME sector. The outcome of this would also be substantially different results if the analysis is performed at sectoral and country/regional levels. Second, the creation of new businesses in one industry or region can have spillover effects in others, especially in Africa where economies are closely integrated, suggesting the need to analyse the effects of SMEs on growth along geographical units of observations (Fritsch, 2013; Andersson & Noseleit, 2011).

Another problem that could arise from estimating Eq. (1) is endogeneity. First, economic growth can lead to an increase in entrepreneurial opportunities and entrepreneurship capital, as well as entrepreneurship can increase economic growth (Carree & Thurik, 2010). Second, it is difficult to include all possible variables that explain economic growth in our models, and finally, the SME sector is subject to substantial measurement error (Beck et al., 2005). For instance, a significant portion of SMEs in Africa operate in the shadow economy, which makes it difficult to

quantify the volume of entrepreneurial activity and entrepreneurship capital in the region. These challenges necessitate the use of instrumental variables to address endogeneity. However, finding perfect instruments that are valid, reliable, orthogonal (uncorrelated with GDPCg), and have no direct effects on the GDPCg is no easy task.

To address those issues, we used the instrumental variable regression (two-stage least squares) as our method of analysis. To control for endogeneity, we included fixed effects and also control for macroeconomic determinants of growth in all our models. Regarding the instruments, some studies have shown that differences in legal systems affect the business environment (Beck and Levine, 2002). Such differences can have implications on the corporate finance of SMEs, and consequently, new firm formation and economic growth. To this end, we create dummy variables for civil law, common law, and landlocked countries and use them as instruments for the regressions to extract the exogenous component of SMEs. We also include the lags of government expenditure and the informal economy as instruments. All instruments passed relevant validity tests.

3.3 Data

In this study, we make use of an unbalanced panel data from 40 African countries in our empirical analysis, collated from the World Development Indicators (WDI) of the World Bank. Countries were retained for the analysis based on the availability of data for both the dependent and the independent variables. The sample was further split by type of legal system, geographic location, and income group. Our sub-sample of low-income, lower-middle-income and upper-middle-income countries is based on the World Bank annual classification for 2024.

The most important way that economic development manifests is through increasing per capita income. In this study, we follow Beck et al. (2005), van Stel et al. (2005), Wong et al. (2005), and a host of other studies in the literature by measuring the dependent variable with real GDP growth per capita. Regarding the independent variable, several measures such as self-employment ratio—i.e., the proportion of the labour force who are self-employed or business owners (see, Thurik et al., 2008; Carree et al., 2002); private sector employment (see, Mueller et al., 2008); and Total Entrepreneurship Activity (TEA) from the Global Entrepreneurship Monitor (GEM) (see, Acs, 2006; Wennekers et al., 2005) are typically employed in the literature, but the data is not available for most countries. It becomes more challenging because a significant portion of SMEs in Africa tend to be informal relative to advanced economies. Although the size of the informal economy is particularly high in Africa—with some estimates valuing it at about 42 per cent of

GDP (Abid, 2016)—, we measure SMEs with the number of new businesses registered in a fiscal year in each of the selected countries. The number of newly registered businesses is not a direct yardstick of SMEs, but it is a well-established proxy for entrepreneurial activities, available for many countries, and can be compared across countries over time. It has also been employed in previous studies by Callejon and Segarra (1999), Berkowitz and DeJong (2005), Audretsch and Keilbach (2008), and Cumming et al. (2014). The data covers the years 2006 to 2022 such that we end up with 499 observations for our empirical analysis. We applied a pairwise deletion process whereby, countries were only retained in the study if they contained data on the number of SMEs.

Figure II presents the scatter of the relationship between economic growth and SMEs with linear and non-linear (quadratic) predicted plots. While the linear plot shows a weak positive slope, the quadratic plots seem to uncover features of a humped-shaped (inverted U-shaped) relationship between SMEs and growth. It suggests that SMEs might affect growth positively, but only up to a certain level before the effect starts declining.

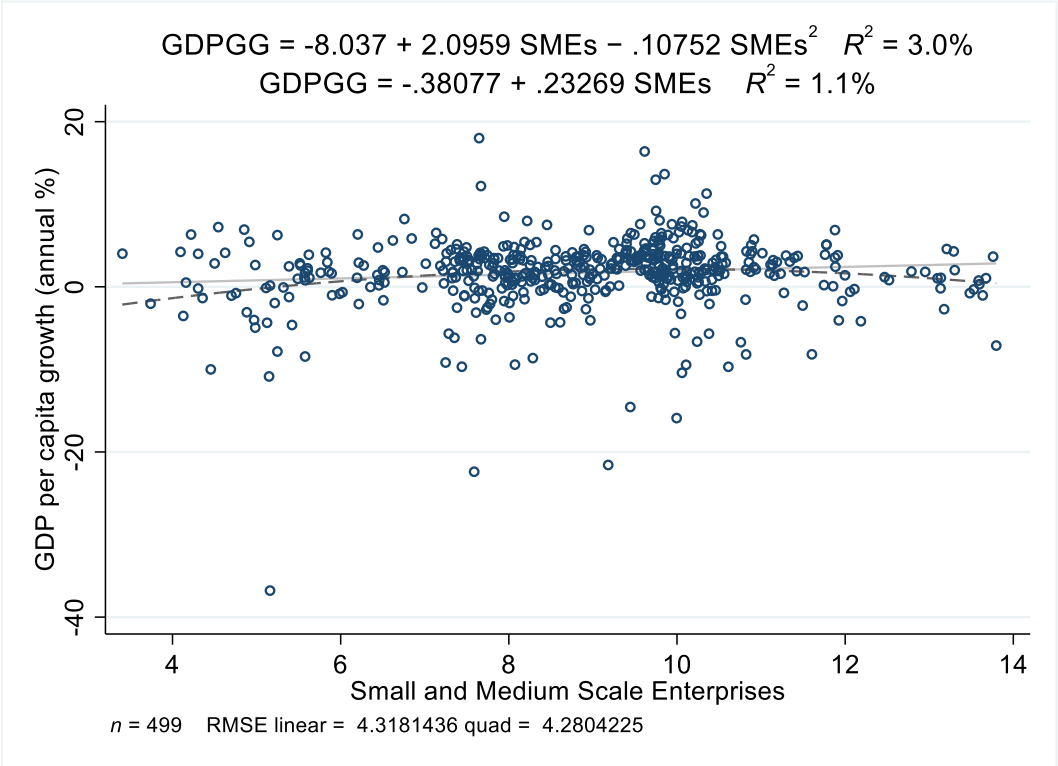

Figure II Two-way fitted plot

Note: N = 499 RMSE linear = .8169296 quad = .8088706

Table I classifies countries in descending order of SMEs, which helps show the relative importance of SMEs on real GDP per capita growth in Africa. Within the period considered, GDP

per capita growth ranged from -1.226% in Central African Republic to 5.6% in Ethiopia. In the same light, the average number of SMEs ranged from 51 in Liberia to 330466 in South Africa and countries with more SMEs seem to have higher GDP per capita over the period considered.

Table I. SMEs and GDP per capita growth in Africa during 2006-2022

Country	SMEs	GDPCg
South Africa	330466	0.61645
Nigeria	78892.4	1.38951
Kenya	43309	1.4808
Morocco	38756.1	2.10452
Ghana	18907.2	4.18289
Ethiopia	14159.7	5.6298
Uganda	13782.3	3.09764
Algeria	13455.3	0.501533
Botswana	12934.3	1.50172
Zimbabwe	12608.7	1.26371
Tunisia	11414.9	1.14277
Cote d'Ivoire	9117.8	4.14998
Zambia	8912.82	1.99354
Mauritius	7649.53	3.04151
Rwanda	7265.07	4.18257
Tanzania	6696.62	3.16373
Egypt, Arab Rep.	6416.53	2.47982
Senegal	6142.18	1.45486
Mozambique	3549.71	0.776313
Cabo Verde	3285.33	1.42336
Burkina Faso	3178	3.44839
Guinea	2884.11	3.38503
Benin	2173.29	1.83434
Eswatini	2089.53	1.8674
Lesotho	1984.27	0.834668
Togo	1901.94	1.90522
Mali	1823.75	0.735503
Madagascar	1692	0.148144
Congo, Dem. Rep.	1684.5	0.752141
Gabon	1233.53	-0.46893
Namibia	1108.29	1.19513
Mauritania	1025	1.395
Sierra Leone	905	2.59466
Chad	823.429	-0.92768
Niger	817.333	2.00642
Malawi	616	4.53872
Central African Republic	193.25	-0.89043
Comoros	179.643	0.708887
Congo, Rep.	73.5333	-1.22678

Liberia	51.1667	0.307404

Note: GDP per capita growth (GDPCg) is averaged from 2006 to 2022 for years in which SME data is available.

While the number of newly registered businesses in a fiscal year is the most comprehensive data for a broad cross-section of countries in Africa, using it as a proxy for SMEs requires important qualifications: First, this variable combines different businesses across different sectors and contexts into a single measure of SMEs, essentially assuming that SMEs—i.e., both those with low and high potential for innovation and growth—and entrepreneurship cultures are the same. Second, SMEs are unweighted for their impact even though some SMEs are likely to have a greater impact on economic growth than others (Thurik et al., 2008; Wong et al., 2005). Third, it does not consider the fact that some registered SMEs rarely go operational or exit the market within a few years of existence, while others graduate into large enterprises over time (Beck et al., 2005). Finally, our yardstick of SMEs only includes formal enterprises and exclude informal SMEs. These factors form the basis of errors in measurement that amplify the problem of endogeneity, motivating our multi-estimation strategy to ensure that the results are robust.

In our empirical analysis, we control for the degree to which the business environment affects economic growth in our model. Countries with good regulations, politically stable, less corrupt, an excellent rule of law, and voice and accountability are likely to have more SMEs and economic growth. Therefore, accounting for the business environment in our growth model helps to assess the robustness of SMEs. Since measures of the investment climate are highly correlated, we applied the method of principal component analysis to reduce the data. To that end, we estimate and retained the first principal component (PC1) of the business climate. Based on the Kaiser criterion, PC1 had the highest Eigenevalue of 4.86 and accounted for 80.93 percent of the total variation. The data on the business climate variables is retrieved from the World Bank Doing Business Index.

To account for the limitation posed by informality, we also include an estimate of the size of the informal sector relative to the formal sector in our models (Beck et al, 2005). We measure the size of the informal economy with the dynamic general equilibrium model-based (DGE) estimates of informal output (% of official GDP) by Elgin et al. (2021). We dropped Sao Tome and Principe, Seychelles, Somalia, and South Sudan from our empirical analysis because of missing data on the informal economy.

To further mitigate the limitation of relying solely on the number of newly created businesses in a fiscal year, we incorporate other growth determinants to create a more comprehensive and nuanced picture of the impact of SMEs in African economies. Following foundational studies on

economic growth such as Barro (1991) and Beck et al. (2005), we included policy variables such as government final consumption expenditure as a share of GDP, and the inflation rate (GDP deflator). We note here that the method of linear interpolation was employed to extrapolate missing observations from our dataset, and the hyperbolic sine transformation to log-transform our SMEs variable[1]. However, none of these adjustments caused any quantitative change in the underlying characteristics of the data such as means and standard deviations (confirmed via t-test and the variance comparison tests).

Table II reports summary statistics for all variables included in our study. It is evident that average annual GDP per capita growth ranged between -36 and 18 percent, the size of the SMEs sector between 15 and 490487, the size of the informal economy between 18 and 63 percent, inflation between -21 and 604 percent, and government expenditure between 3 and 43 percent. SMEs and the investment climate are mildly asymmetrical, while the size of the informal economy is moderately skewed. However, government expenditures are highly skewed, while GDP per capita growth and inflation are extremely skewed. Results from the Shapiro-Wilk test in Table II show that we can reject the normality assumption for the residuals of GDP per capita growth. Evidence is supported by the distance of the kernel density estimate from the overlaid normal density function in Figure I. The pairwise correlation matrix also shows that there exists no risk of multicollinearity between our independent variables.

Table II Summary statistics

Variable	GDP per Capita Growth	SMEs	Investment climate	Informal economy	Inflation	Government consumption
Mean	1.68	20622.34	0.003	36.019	8.092	15.495
Std. Dev.	4.338	62898.91	2.168	8.778	30.929	6.933
Min	-36.778	15	-4.564	18.916	-21.165	3.603
Max	18.015	490487	5.29	62.398	604.946	43.482
Skewness	-2.397	-0.196	0.438	0.55	15.688	1.395
Shapiro Wilk	9.890***	4.317***	5.808***	5.454***	13.530***	7.771***
Correlations Matrix						
GDP per Capita Growth	1.000					
SMEs	0.100	1.000				
Investment climate	0.105	0.349	1.000			
Informal economy	-0.028	-0.244	-0.564	1.000		
Inflation	-0.106	0.094	-0.101	0.188	1.000	
Government consumption	-0.125	0.020	0.441	-0.434	-0.104	1.000

[1] Hyperbolic sine log transformation, $\log(k) = \ln[k + \sqrt{(k^2 + 2)}]$

Notes: The list of 40 countries is as follows: Algeria, Benin, Botswana, Burkina Faso, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Congo, Rep., Cote d'Ivoire, Egypt, Arab Rep., Eswatini, Ethiopia, Gabon, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe
Source: Authors based on data availability

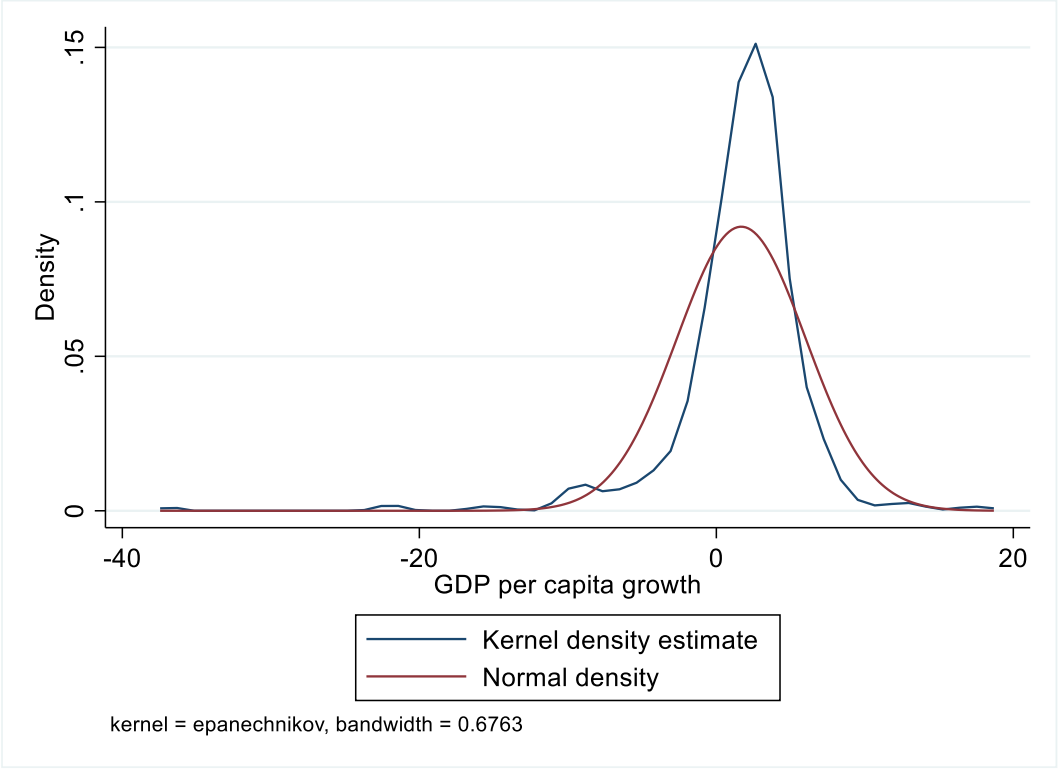

Figure I Kernel density estimate

4. Results

4.1 Main results

We use two-stage least squares regression to estimate the impact of SMEs on economic growth. Column 1 of Table III contains the growth model for the full sample of African countries where the coefficient of log of SMEs is positive and significant, which is consistent with the endogenous growth theory which views entrepreneurship as a crucial factor in economic growth that leads to job creation and increased productivity. The positive effect of SMEs on economic growth is broadly in line with many studies in the literature (van Stel et al., 2019; Erken et al., 2018; Cumming et al., 2014; Audretsch & Keilbach. 2008; Beck et al., 2005). However, most of these positive findings were based on developed countries. When the level of economic development was considered, previous studies such as Van Stel et al. (2005) and Wong et al. (2005) found a considerably small and sometimes negative effect of SMEs on economic growth in developing

countries. Such negative relationships in developing countries can be attributed to a higher likelihood of people trying to leave self-employment to wage employment (Acs, 2006). Contrary to these findings, we found SME has a strong positive impact on growth. In Africa, the current economic landscape is characterised by an increasing cost of living without a corresponding increase in wages, and jobless growth. Anecdotal evidence suggests that more people are combining wage employment with entrepreneurial activities or are using wage employment as a stepping stone to raise enough capital for their entrepreneurial activities. Further, wage employment only accounts for about 30 percent of employment in Africa, while self-employment accounts for almost 76 percent (Fields, 2019; Lund, 2012). Therefore, it is highly unlikely that SMEs would cause a negative relationship to economic growth in such a scenario. Our findings also show that the coefficient of the log of $SMEs^2$ in column 1 yield significant negative effects on GDP per capita growth, suggesting a nonlinear relationship over time.

Therefore, our results lead to one common conclusion: SMEs enhance economic growth in Africa. Taken together, SMEs and SMEs squared results comprise a new understanding of the dynamic relationship between SMEs and economic growth. It indicates that an increase in the size of the SME sector enhances economic growth up to a certain threshold, beyond which growth starts decreasing, exhibiting an inverted U-shaped relationship. The results imply that SMEs may play different roles in economic growth at different times in countries at different stages of economic development (Wennekers et al., 2005). Our findings confirmed the argument of Scherer's (1991) which was among the first to discover the diminishing importance of SMEs on economic growth over time. Our results also support nascent findings from Ofori-Sasu et al. (2024) of a possible nonlinear relationship between entrepreneurship and economic wealth in Africa. In addition, our findings are also broadly consistent with Fritsch and Mueller (2004), and Van Stel and Storey (2004) who documented evidence of non-linear relationship between entrepreneurship and economic growth in their samples of mostly high-income countries, but in the form of an inverted u-shape. In fact, Fritsch (2013) reviews substantial literature which shows that the growth-enhancing effects of entrepreneurship usually fade away after the 10th year. Such diminishing effects of SMEs over time can be explained by the demand- and supply-side conditions.

On the demand side, economic development is generally accompanied by a decline in the share of agriculture and an increase in manufacturing share. Taken together, these diminish opportunities for self-employment in agriculture or very small-scale industries. The literature also shows that "self-employment declines as economies become more developed (Acs, 2006, p.102)." On the

supply side, "managerial talent" generally varies across the working population such that as wages increase, the real cost of self-employment increases thereby inducing the necessity entrepreneurs to become workers (Lucas, 1978). Additionally, as economies grow, many entrepreneurs become risk averse and prefer "safe" wages from being employees (Yamada, 1996, Iyigun and Owen, 1998). The combined effects of these justify the declining role of the SMEs at higher levels of economic growth in Africa.

We also examine the impact of SMEs on growth by three sub-samples, i.e. legal systems, geographic location, and income group, as shown in columns (2) to (8) in Table III. These results are largely congruent to those in the full sample. Existing studies show that different legal origins may have different impacts on financial development and hence affect the financing constraints faced by business corporations (see, La Porta et al., 1998; Levine, 1999; Beck & Levine, 2002). In particular, they show that common law system, relative to civil law systems, give investors rights and tend to promote business ownership. However, our results show that no matter whether the countries are under civil law or common law, the non-linear relationship of SMEs, in the form of an inverted U shape, with economic growth hold. That is, the legal environment does not affect much the nonlinearity in the relationship between SMEs and growth. This is understandable as small businesses in Africa usually function under a direct corporate governance structure, as well as simple financing through the banking sector. Therefore, those differences in the legal system may not have a significant impact on SMEs.

In addition to the legal system, existing literature also demonstrates that geographical location may affect business development (see, North & Smallbone, 2000; Audretsch & Dohse, 2007). Therefore, we divide the sample into landlocked and coastal countries and test if the geographic location has any impact on the SME-growth relationship. As shown in columns (4) and (5) in Table III, the geographic location does exhibit a significant influence on SME growth nexus in Africa. Both landlocked and coastal counties experience the non-linear relationship of SMEs and growth with 1% significance. The positive impact of SMEs on growth in landlocked countries triples compared with those in coastal ones. We argue that landlocked countries are more likely to face higher transportation and trade costs, as such the development of localised markets and SMEs to meet domestic demand becomes important in driving economic growth.

Finally, studies also show that the stage of economic development may influence the effect of entrepreneurship on economic growth differently (Yamada, 1996; Iyigun & Owen, 1998; Wong et al, 2005). In particular, Acs (2006) hypothesised that entrepreneurship may be negatively correlated

with economic development in developing countries compared to developed countries since most people attempt to move from self-employment to "safe" wage employment. We divided our sample into low-income countries, lower-middle-income countries and upper middle-income countries to verify if income group has any effects on the SMEs-growth relationship across the sample. Our results in columns (6) to (8) show that income group influence the effects of SMEs on economic growth. Both low income and lower-middle-income countries experience a nonlinear impact of SMEs at 1% level of significance, but not upper middle-income countries. We argue that LIC and LMICs have a strong entrepreneurial spirit that drives innovation and job creation, while upper-middle-income countries may have more established markets, reducing the influence of the SMEs sector on economic growth.

Table III. 2SLS full sample and sub-sample results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full sample	Legal system		Geographic location		Income level		
VARIABLES	Africa	Civil Law	Common law	Landlocked	Coastal	LICs	LMICs	UMICs
SMEs	2.700***	2.889***	1.773*	7.217***	2.623***	5.108***	2.656***	1.751
	(0.487)	(0.956)	(1.052)	(2.017)	(0.512)	(1.945)	(0.594)	(2.649)
$SMEs^2$	-0.132***	-0.149**	-0.0884*	-0.411***	-0.129***	-0.261**	-0.126***	-0.0839
	(0.0243)	(0.0585)	(0.0513)	(0.131)	(0.0263)	(0.125)	(0.0376)	(0.122)
D.Investment climate	2.310*	2.449	0.834	6.255**	-0.344	5.415	0.766	-1.192
	(1.351)	(1.758)	(1.039)	(3.019)	(0.810)	(3.673)	(0.827)	(1.465)
D.Informal	-1.705***	-1.742***	-2.106***	-2.623*	-1.300***	-1.499	-1.392***	-2.553
	(0.435)	(0.607)	(0.689)	(1.400)	(0.431)	(1.537)	(0.414)	(1.586)
Inflation	-0.0163***	-0.0599**	-0.0129***	-0.0127***	-0.0602	-0.0325	-0.0143***	-0.200**
	(0.00331)	(0.0299)	(0.00306)	(0.00331)	(0.0409)	(0.0494)	(0.00229)	(0.0991)
D. Government consumption	-0.681***	-1.217***	-0.373	-0.618*	-0.762**	-0.784	-0.447	-0.859*
	(0.250)	(0.299)	(0.281)	(0.332)	(0.366)	(0.555)	(0.288)	(0.481)
Constant	-10.49***	-11.90***	-4.829	-28.67***	-9.774***	-21.98***	-11.06***	-3.758
	(2.480)	(3.938)	(5.139)	(7.338)	(2.621)	(7.471)	(2.362)	(13.45)
Fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	440	264	192	136	304	116	217	94
Number of ID	39	24	17	13	26	14	18	6

Note: *** p<0.01, ** p<0.05, * p<0.1 indicate significance at 1%, 5%, and 10% levels, respectively. Standard errors in parentheses. GDP per capita growth rate is the dependent variable. Estimation is by two-stage least squares. All models included time-fixed effects not shown on Table.

Our model included four control variables—the investment climate, the size of the informal sector, inflation, and government consumption expenditures. The investment climate was included to account for the static nature of our SMEs variable, since it does not factor in the entry of new firms, progression into large enterprises, and exit of firms from the market (Beck et al., 2005). The coefficients of the investment climate—the first principal component of six governance indicators (regulatory quality, governance effectiveness, politically stability, corruption perception, rule of

law, and voice and accountability)—is positive and significant in Africa and landlocked countries. Countries with better investment climates and institutions are generally expected to perform better with economic growth (Acemoglu et al., 2001). The coefficients of the size of the informal economy (unofficial economy as a percentage of GDP) are negative and highly statistically significant as expected (Medina et al., 2017; Abid, 2016; Beck et al., 2005). Since the effectiveness of SMEs in fostering growth is theoretically a function of the size of Schumpeterian entrepreneurs, a high level of informal economic activities is likely to limit their growth and ability to contribute to economic growth (van Stel et al., 2005). Additionally, the coefficient of inflation is negative and highly significant across most of our regression equations and in the sub-samples. Inflation is generally associated with uncertainty that discourages investment and economic growth (Barro, 1991). Finally, government consumption expenditure is also negatively associated with economic growth. According to Barro (1991), higher government expenditures lower savings and economic growth through the distorting effects of taxation and other government expenditure programmes.

In this 2SLS regression, we used dummy variables for civil law, common law, and size of the informal economy and government expenditure serving as instruments to extract the exogenous effect of SMES on growth. Our instruments were robust and passed relevant validity tests. Specifically, the chi-square test from the Anderson canonical correlation LM statistic test showed that our instruments were relevant and the model was identified. Similarly, the p-value of the Sargan statistic for the overidentification test of all instruments showed that our instruments were valid.

4.2 Robustness check

After presenting these main results, we proceed to robustness check by controlling for cross-sectional dependence, serial correlation, and endogeneity. There are three main reasons why the test of cross-sectional dependence is important in our study: (1) there is large economic interdependence in Africa as countries share common economic policies and trade agreements that may affect SMEs similarly across countries; (2) economic developments in one country can easily spillover to neighbouring countries or the entire region, impacting SMEs and their contribution to growth; and (3) the test helps validate or refute the assumption that our cross-sections are homogeneous, which is important for model specification. Our results based on Pesaran and Xie (2021) with 4 PC(s) suggested that GDP per capita growth was strongly correlated across panels in Africa, suggesting the presence of CD. To control for the presence of cross-sectional dependence, we employed the Driscoll and Kraay fixed effect model (DK-FE) and the results are shown in column 1 of Table IV.

We also employ the Dynamic Ordinary Least Squares (DOLS) and the Fully Modified Ordinary Least Squares (FM-OLS) as additional checks for robustness to control for the effects of non-stationarity, cointegration, and endogeneity issues. Firstly, the DOLS model utilises Monte Carlo simulations and is unbiased. It enhances both lagged and primary differences in the series to reduce endogenous feedback (Kao & Chiang, 2001). DOLS is generally more robust to weak instruments, handles multiple endogenous regressors, provides more efficient estimates than the 2SLS regression, and even provides more accurate estimates than bootstrap methods. Second, FM-OLS model incorporates individual intercepts and adjusts for serial correlation in the error processes among panel members (Pedroni, 2004), and also corrects for heteroscedasticity. When we tested for serial correlation using the Bias-corrected Born and Breitung (2016) Q(p)-test procedure, it indicated evidence of some serial correlation of the first order [Q(p)-stat=6.6, p-value=0.00], but not second order serial correlation in our sample. Additionally, FM-OLS accounts for endogeneity and simultaneity bias, allows for testing of long run coefficients, is robust to model misspecification and outliers, and generally provides more efficient results than the 2SLS. While the DOLS performs better in large samples, the FM-OLS is more efficient in reduced samples as in this study. Together, these estimators enable us to ascertain the robustness of our parameters.

Columns (1), (2) and (3) in Table IV present the results from the DK-FE, the DOLS, the FM-OLS, respectively. Again, all those results are consistent with our main findings that SMEs have a nonlinear relationship with GDP per capita growth in Africa.

Table IV Robustness results from DK-FE, DOLS and FM-OLS

VARIABLES	(1) Full sample DK-FE	(2) Full sample DOLS	(3) Full sample FM-OLS
SMEs	5.433**	2.700***	2.571***
	(2.532)	(0.632)	(0.578)
$SMEs^2$	-0.249*	-0.132***	-0.119***
	(0.138)	(0.0349)	(0.0319)
D.Investment climate	1.728	2.310***	2.517***
	(1.228)	(0.783)	(0.717)
D.Informal	-1.939**	-1.705***	-1.760***
	(0.798)	(0.445)	(0.408)
Inflation	-0.0160**	-0.0163***	-0.0201***
	(0.00674)	(0.00540)	(0.00495)
D. Government consumption	-0.706**	-0.681***	-0.653***
	(0.259)	(0.104)	(0.0949)
Linear			-0.00489***
			(0.00130)
Constant	-26.57**	-10.49***	-9.077***
	(11.77)	(2.851)	(2.616)
Fixed-effects	Yes	Yes	Yes
Observations	440	440	439
R-squared		0.369	0.088
Number of groups	39	39	39

Note: *** p<0.01, ** p<0.05, * p<0.1 indicate significance at 1%, 5%, and 10% levels, respectively. Standard errors in parentheses. GDP per capita growth rate is the dependent variable. Estimations are by Driscoll and Kraay robust standard errors (1), dynamic OLS (2), and fully modified OLS (3). All models included time-fixed effects not shown on Table.

5. Concluding remarks

In an effort to support and enhance the contribution of SMEs to economic growth, governments have dramatically increased financial resources to SMEs. Consequently, the study of Small and Medium Scale Enterprise (SMEs) and its effects on growth has become one of the most important research areas in business. Empirical studies arrived at mixed results in terms of magnitude, direction of the effect, and level of statistical significance (Fritsch, 2013; Van Stel et al., 2005; Wong et al., 2005), yet the majority of the evidence is from North America and Europe. We hypothesised that SMEs might have a nonlinear relationship with economic growth. To examine this issue, we employed instrumental variable regression with data from 40 African countries over 2006 to 2022 to test a possible nonlinear SMEs-growth hypothesis. Finally, we conducted a battery of robustness tests— with Driscoll and Kraay fixed effect, dynamic OLS and the Fully Modified OLS—to show that our results were not affected by cross-sectional dependence, heterogeneity, endogeneity, and simultaneity bias.

Our estimations led to one common conclusion: there is a nonlinear relationship between SMEs and economic growth in Africa. This suggests the existence of a tipping point beyond which SMEs become ineffective. Second, this relationship between SMEs and growth extends into civil law, common law, landlocked, and coastal countries. The results remained consistent after controlling for simultaneity bias, endogeneity, and a series of other socioeconomic country characteristics. We draw two important implications from these results. First, economic growth and job creation are amongst the most important macroeconomic policies. While much of the debate tends to focus on traditional macro-economic policies such as investments in human capital, infrastructure, and monetary policy instruments, the literature review and our empirical findings suggest that nonconventional instruments such as SMEs support can enhance job creation and economic growth. Therefore, African countries may pursue policies aimed at boosting SMEs support which could include easing processes for starting new SMEs, and targeted financing or tax incentives. Secondly, African countries may consider the transient effects of SMEs on growth by adopting long-term policies to ensure that the effect of SMEs remains positive and sustainable over the long run. These can include policies that promote firms to grow and transition from SMEs into larger enterprises. The literature clearly shows that self-employment tends to decline as economies develop because of increasing opportunity cost, insinuating a fundamental problem with SMEs management (Acs, 2006). Investing in developing managerial talent via management education could help SMEs become more successful and committed to the long run success of their businesses. While our findings contradict the recommendation by Wennekers et al. (2009) that low-income nations "should not consider the promotion of new business start-ups as a top priority on their policy agenda," we agree that pursuing the path of scale economies by helping firms grow into larger enterprises can pave a better way for other SMEs.

In spite of these results, we caution that using the number of Startups as a yardstick of SMEs could be misleading as it tells us nothing about the size of Schumpeterian and marginal or part-time establishments. Second, given the importance of using longer time lags in several studies (Fritsch, 2013; van Stel & Storey, 2004; Audretsch & Fritsch, 2002; Audretsch et al., 2002), it would be important to consider a more rigorous study of the growth effects of SMEs in Africa over a longer period. It would also be important for future studies to determine whether (i) the nonlinear relationship observed in this study occurs in all African countries, and (ii) the relationship is sustainable over the long run. Additionally, another space for future research is moderating variables—for instance, institutions—that influence the SME-growth relationship. Obviously, this would require a unified theory explaining conditions and mechanisms through which SMEs

enhance growth in Africa. Finally, studies should consider the job-creating effects of SMEs in Africa, an important linkage that is still underexplored in the literature.

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