African lions on the move: Can policies, institutions, and endowments explain the growth of climbing countries?

Christian Samen Otchia
Graduate School of International Developmet, Nagoya University, Japan

Abstract

In this paper, we define African *climbing countries* as those that have realised increased annualised economic growth since reaching a per capita GDP of US $500. We identified 16 countries out of 47 as climbing countries, but five of them stood out, with an average growth of 4%. We showed that *climbing countries* experienced a positive structural transformation and were still in the process of industrialising, whereas non-climbing countries experienced premature deindustrialisation. We then used Bayesian model averaging to show that growth among climbing countries occurred because of favourable trade policies and good use of natural resources.

Keywords: resource curse, economic development, institutions, growth regressions, GDP per capita

1. Introduction

Two dominant features of the sustainable development of Sub-Saharan Africa (‘Africa’ henceforth) are continuing concerns among policymakers, donor-aid agencies, and researchers. First, many African countries seem to remain in the natural resource trap and exhibit weak long-term growth as well as an increasing rate of poverty and inequality. Second, premature deindustrialisation has occurred in Africa despite high economic growth and increasing demand for manufactured products. While considerable attention has been paid to deindustrialisation and the natural resources curse, the success experienced by many African countries is much less well-understood. Understanding the factors behind the success of African countries is important, taking into consideration the fact that African policymakers have been proactive in developing policies and programs to foster structural change and accelerate economic growth.

In 2000, after a period of relatively unstable, poor economic performance, Africa entered a stage of high, sustained economic growth. This growth trend can be divided into two periods: the boom period (2000-2008) and the post-crisis period (2010-present). From 2000 through 2008, the real GDP of Africa rose by 5.5% per year, more than twice the pace of growth in the 1980s and 1990s. Africa grew by an average of 2.2% in the 1980s, and, in the 1990s, the growth rate was about 1.4%. The 2007-08 financial crisis had only temporary effects on Africa’s growth, which picked up again in 2010. Since then, its growth has averaged 5% annually.

For years, Africa’s growth has been shaped by commodity prices, but the difference between domestic reforms and ownership over development programmes explains the heterogeneous performance within the continent. Table 1 depicts the recent trends in GDP growth in Africa by classifying countries according to resource endowment. As can be seen, resource-rich (oil- and mineral-rich) countries have higher per capita GDPs, but the growth of resource-rich countries included more booms and busts during the period of analysis than that of resource-scarce countries. In addition, resource-scarce countries have experienced increasing, stable growth since the 1980s. Heterogeneity can also be observed by the type of endowment, and growth in oil-rich countries is more volatile than in mineral-rich ones.

Table 1. GDP growth in Africa, 1960-2018

	1960s	1970s	1980s	1990s	2000s	2010s
			a. Mean GDP per capita			
Resource-rich	1655.71	2443.00	2313.63	2143.22	2947.88	3374.77
Resource-scarce	797.34	950.21	1028.21	1231.97	1427.00	1836.74

Oil-rich	1800.20	2951.45	2690.94	2573.73	3907.24	4281.83
Mineral-rich	1487.15	1849.80	1918.76	1755.76	2084.45	2558.41
	b. Growth rate of GDP					
Resource-rich	4.43	5.16	2.85	3.77	5.78	3.79
Resource-scarce	3.78	4.38	3.10	3.57	3.96	4.46
Oil-rich	3.78	5.78	2.91	5.61	7.12	3.03
Mineral-rich	5.19	4.43	2.79	2.11	4.57	4.48

Source: author's calculations based on World Development Indicators.

We present new empirical evidence showing that policies and endowments have driven successful growth in Africa. Our major contribution is that we have developed a simple method to identify successful countries and make use of modern econometric techniques to explain their growth in a systematic way. We define 'climbing countries' as those that have realised increased annualised economic growth since reaching a threshold of US $500 compared to countries with similar per-capita GDPs. We identified a set of climbing countries (33% of our sample) whose economies grew by more than 3% annually since reaching the threshold mentioned above. Among them, five countries' economies grew by more than 4% and can be considered 'African lions'. These economies exhibited a positive structural change and did not experience premature deindustrialisation. We also found that climbing countries can take advantage of high commodity prices and are more resilient than non-climbing ones. Their economic growth is also driven by policy.

The remainder of this paper is organised as follows. Section 2 documents the stylised facts that drove our analysis. Section 3 describes our methodology and data. Section 4 presents the determinants of economic growth, while Section 5 relates our findings to the literature. Section 6 concludes the paper.

2. Stylised facts

This section outlines several facts that motivate our analysis. First, we established the group of climbing countries whose economic growth stood out in the context of countries with similar per-capita GDPs. Second, we examined how climbing countries exhibited lower dependence on commodity prices, fostered positive structural changes, and avoided experiencing premature deindustrialisation.

2.1. African lions and Asian tigers

Economists have suggested that African countries should not mimic the paths, modes, or specific

policies of Asian economies, given that the latter's initial conditions differed and they followed highly unusual, distinctive paths of growth (Otchia 2015). To shed light on this issue, Figure 1 displays the evolution of real GDP per capita for African countries once they reached a per-capita GDP of US $3,000. Only 11 countries of the 47 in our sample reached this threshold. South Korea was also included to illustrate a successful case of an East Asian economy. The figure indicates considerable variations in African countries' growth experiences, with some exhibiting small positive economic growth and others stagnating. Moreover, countries with strong positive economic growth reached the US $3,000 threshold before the other countries, as reflected by the more extended time series included for those countries. For example, South Africa, Gabon, and the Seychelles reached a mid-level per-capita GDP of US $3,000 in 1960, 1960, and 1964, respectively, whereas Botswana and Mauritius reached the threshold in 1987 and 1986.

In contrast, the African countries with the fastest-growing GDPs progressed poorly compared to South Korea. This contrast may indicate that African countries' poor performance was unrelated to initial conditions, an idea advanced in the literature. For instance, the difference between South Korea and African countries, such as Angola and Congo, that reached the US $3,000 threshold in the same years is illustrative.

Overall, the picture that emerges from Figure 1 is one in which only a couple of countries (Mauritius and Botswana) grew extremely quickly after reaching a GDP of US $3,000. Neither country emulated the East Asian miracle, however. The Seychelles' trajectory began to accelerate 40 years after reaching the threshold. Mauritius has become a successful case in Africa, exhibiting positive, stable growth in the last 25 years. Gabon and Equatorial Guinea had an initially promising trajectory. However, Figure 1 shows a downward trend in their per-capita GDPs, beginning in the tenth year for Equatorial Guinea and the seventeenth for Gabon; neither country has recovered since then. Taken together, the data show that the growth of the large African countries is slowing, and none of them shows promising growth that emulates the East Asian model.

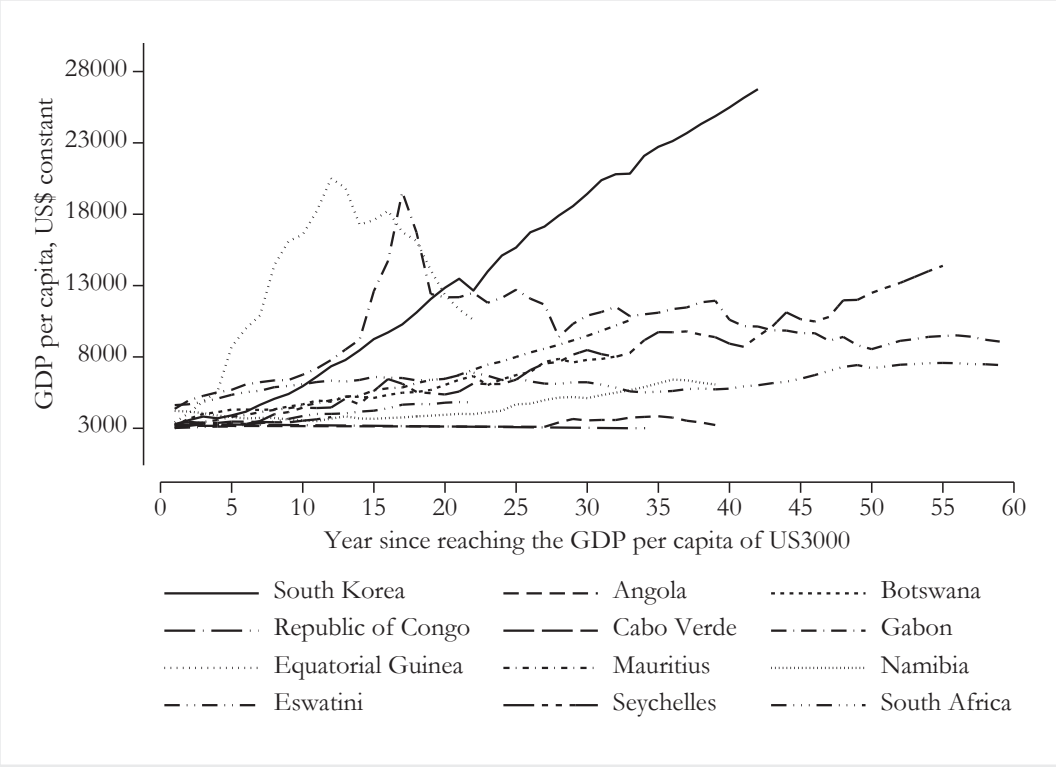

Figure 1. Cross-country comparison of African countries (countries exceeding per-capita GDP of US $3,000)

Source: author's calculations based on World Development Indicators.

We extended this analysis to African countries that experienced per-capita GDP growth after reaching US $500 but did not exceed US $3,000. Among the 47 countries in our sample, it appears that 32 reached the threshold of US $500 but not US $3,000, while only 11 countries exceeded the latter number. This indicates that a non-negligible number of countries is still struggling to reach moderate income levels. To ensure that growth patterns were not driven by the magnitude of the GDP when the countries reached the US $500 threshold, we computed the average growth rate between the first year and 2018, when our time series ended. Figure 2 illustrates this growth by contrasting it with the log of real per-capita GDP in 2018. This exercise reveals a clear picture of fast convergence in recent years. Lesotho, Kenya, and Soudan experienced rapid growth and more than doubled their per-capita GDPs. The GDP of Soudan has fallen since 2015 due to the devaluation of the local currency but remains high. The second group of countries experienced growth of between 50% and 100%; it included Nigeria, Tanzania, Guinea, Benin, Mauritania, and Ghana. Most of the countries in our sample experienced positive economic growth that did not exceed 50%. The last group suffered a slowdown and stagnation after reaching the US $500 threshold. Gambia, Sierra Leone, Liberia, and Malawi are stagnating. The countries experiencing a large slowdown are Madagascar, Niger, the Central African Republic, and the DRC. These countries have experienced conflict and war, but the DRC stands out with a sizeable negative

growth rate.

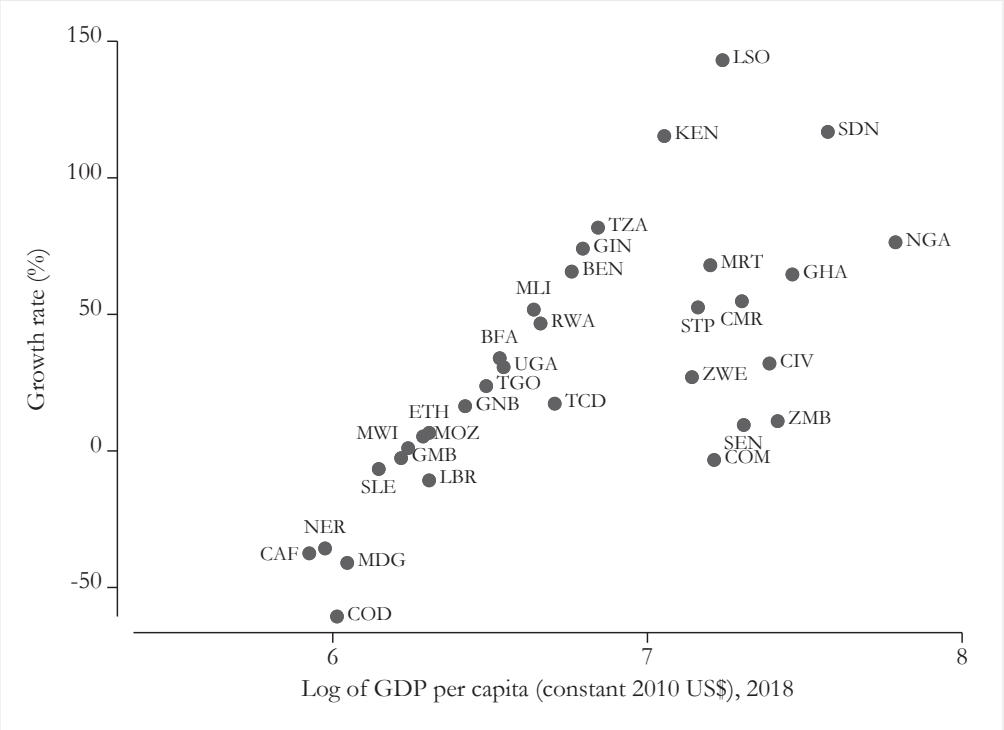

Figure 2. Cross-country comparison of African countries (per-capita GDP between US $500 and US $3,000)

Source: author's calculations based on World Development Indicators.

As discussed earlier, the preceding results reflected cross-sectional experiences with economic growth at specific points in time after reaching the US $500 threshold. In the data omitted here, we saw a considerable variation in the number of years since reaching the threshold, which ranged from 2 to 60. For instance, Ethiopia reached the threshold of US $500 in 2005, whereas Chad and Tanzania reached it in 1990. To facilitate the identification of 'African Lions' on the move, we needed to obtain comparable measures of countries' economic growth that considered the number of years that had passed since reaching the threshold. An alternative, simple way of using the data was to plot the countries' annualised economic growth rates. This alternative approach appeared to be consistent with the countries' trajectories when, for instance, we assumed that a similar number of years had passed since reaching the threshold for all the countries.

Figure 3 plots the annualised growth rates for the countries, including those above the threshold of US $3,000 against the log GDP per capita in 2018. The figure overlays the local polynomial regression with 95% confidence intervals to emphasise these trends. Given this representation, we were able to easily assess the selected countries' growth performance above the local polynomial regression line against that of the rest of the countries, thereby indicating which countries had 'climbed the income

ladder' more than others. The set of climbing countries is represented, along with the real income distribution, by similar annualised growth rates. Countries like Ethiopia, Rwanda, Cape Verde, Botswana, and Equatorial Guinea emerge at the top, followed by Burkina Faso, São Tomé and Príncipe, Lesotho, Tanzania, and Uganda. The broad definition, which we use throughout this study, also includes countries above the local polynomial regression line, such as Kenya, Mozambique, and Guinea.

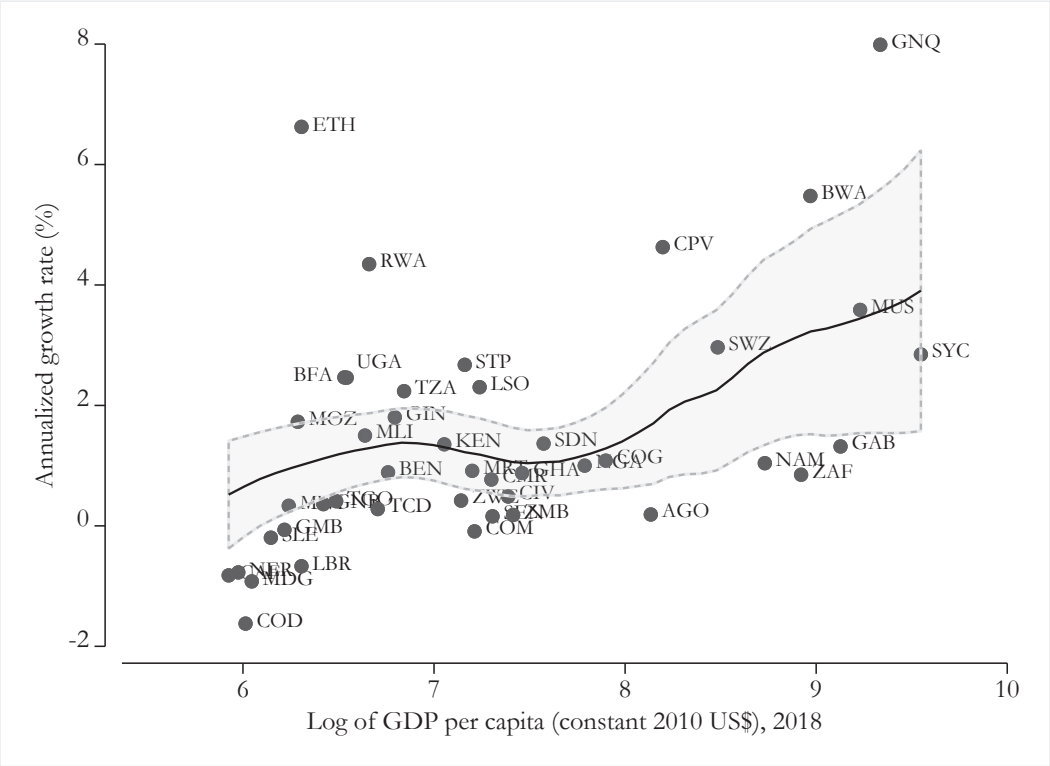

Figure 3. Climbing countries

Source: author's calculations based on World Development Indicators.

Note: This figure is a scatter plot of the difference in the annualised growth rate between the year when each country exceeded the US $500 threshold and 2018 and the log of GDP per capita. The solid line represents the fitted local polynomial regression model, and the grey lines and area show the confidence bounds of the fitted local polynomial regression line.

2.2. Natural resources/commodities and growth

The second driving factor is the well-known dependence of Africa's economic growth on the growth of commodity prices. Important literature has documented that much of Africa's GDP growth is driven by booms in commodity prices and increased demand for raw materials because these countries' economies depend on the export of primary commodities. Deaton (1999), for instance, argued that rising prices help economic development in Africa because these countries' economies do better when the prices of commodities are rising than when they are falling. Recent research has established that the resurgence

of growth in Africa is more than a resource boom, however. According to AfDB *et al.* (2013), natural resources have accounted for roughly 35 percent of Africa's GDP growth since 2000. Trade, construction, and, most importantly, domestic economic reforms implemented in early 2000 have also contributed to African development. Having identified the climbing and non-climbing countries, a natural question to ask is whether this strong historical correlation still holds true.

To provide new insights, we will present stylised facts about growth and commodity prices in Africa. Following Deaton (1999), we recalculated the price indexes from the price data of a list of 23 primary commodities from the World Bank Commodity Market. We also used the figures for per-capita GDP in constant 2010 prices from the World Bank's World Development Indicators. Figure 4 shows the relationship between, on the left-hand scale, the growth of real per-capita GDP, and, on the right-hand scale, the growth in the commodity price indexes for climbing and non-climbing countries, which are shown as three-year moving averages. Consistent with Deaton (1999), we found a strong historical correlation between GDP growth and commodity prices. However, the data split shows that the correlation between commodity prices and economic growth appears to be greater for non-climbing countries than for climbing ones. The correlation between commodity prices and the economic growth of climbing countries over the 1960-2018 period was -0.11, which was smaller in absolute value than that found in non-climbing countries (0.21).

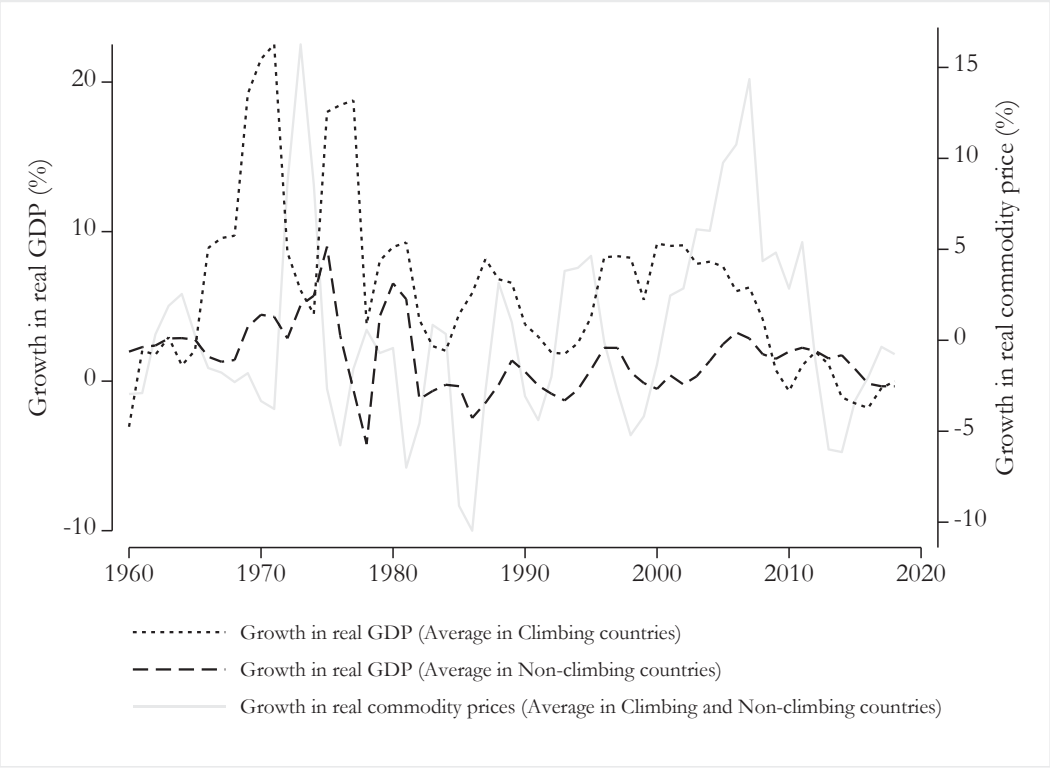

Figure 4. Economic growth and commodity prices in Africa, three-year moving averages
Source: author's calculations based on the World Development Indicators.

2.3. Structural changes

A third driving fact is structural changes, that is, the reallocation of resources and output from agriculture to industry and services. Documented as one of the key stylised features of economic development (Chenery 1960, Clark 1957, Kuznets 1966, Syrquin 1988), proponents of this theory generally state that the economic development of nations begins with a rise in industrial production and a relative decline in agriculture, followed by a decrease in the industrial sector and a sustained increase in services. The early research confirmed these structural changes for early industrialisers and predicted that other regions would follow the same development pattern. Recent studies, such as that of Otsubo and Otchia (2020), have also documented these development processes for late industrialisers. Together, these studies indicate that most African countries follow a backwards structural change by moving resources from high- to low-productive sectors.

Figure 5 compares the evolution of the average shares in each sector for climbing and non-climbing countries from 1960-2018. There is a clear difference between the two groups of countries. First, they begin with different economic structures. The climbing countries begin with the agricultural and manufacturing sectors accounting for a relatively high proportion of the GDP and the service and industry sectors making a much lower contribution to it. Second, the decline in the agriculture sector's contribution to the total output is distinct for the climbing countries compared to the non-climbing ones. Figure 5 depicts a clear downward trend in the agriculture sector's contribution for both country groups, but the decrease occurs faster in climbing countries. In both cases, the proportion of the GDP accounted for by agriculture was below 20%.

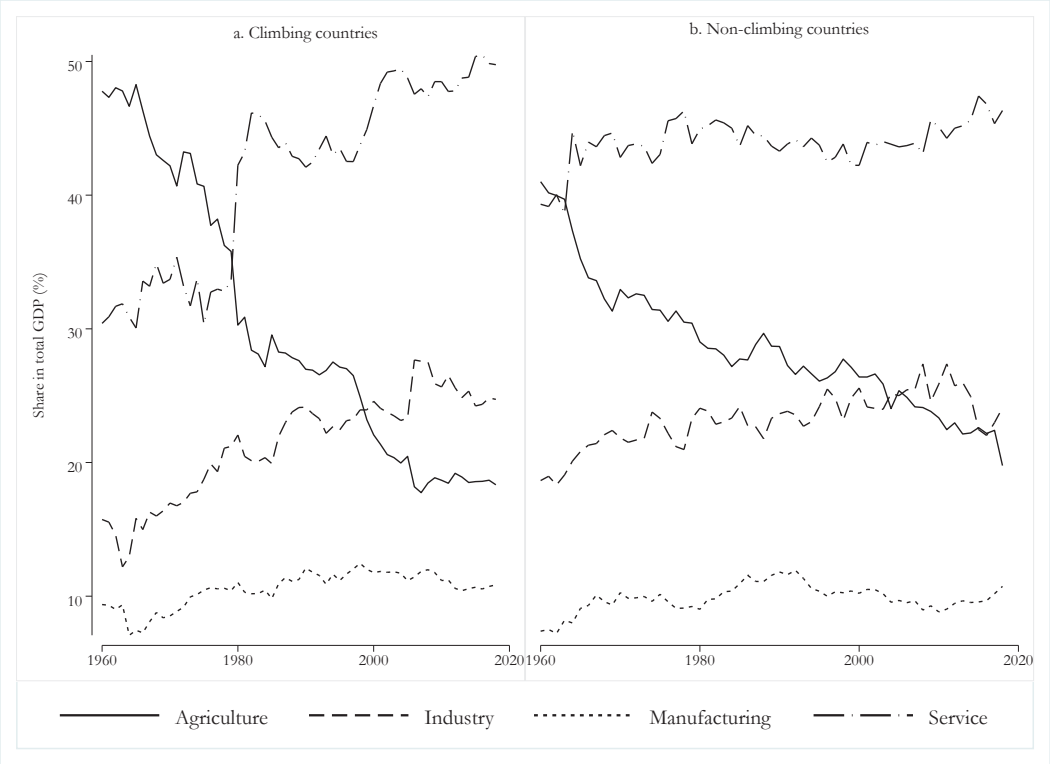

Figure 5. Structural changes in climbing and non-climbing countries
Source: author's calculations based on the World Development Indicators.

Third, there have been no significant structural changes from agriculture to industry. While we see a share of the GDP of roughly 25% (up from about 15%) for the climbing countries, the industry sector remains mostly stagnant in the non-climbing countries. The manufacturing sector has also remained static throughout the same period. Moreover, the industry sector reached its peak during the 2000s, but its recovery has been slow. The slowdown in manufacturing is a feature common to many countries. These patterns are still more strongly tied to per-capita GDP across countries than a specific year, as will be shown in the next subsection. The structural shift from agriculture to industry (mainly manufacturing) is important for the diversification of the economy, including production and exports, which are critical aspects of Africa's economic development. Indeed, according to Henn *et al.* (2020), export diversification is not only associated with lower production volatility but also with higher rates of economic growth. Diversification, including employment diversification, is associated with higher per-capita GDPs. In addition, the type and quality of export products tends to increase with production diversification (Henn *et al.* 2020).

Concerning the service sector's contribution to the GDP, a closer examination shows that the contribution of the service sector to the GDP was more significant in climbing countries. While there was substantial variation in growth rates, the structural change in the climbing countries was apparent. It is clear that service-sector growth accelerated post-1980. In non-climbing countries, we again see an

apparent turning point in 1965, but the service sector's contribution has remained virtually unchanged. Overall, it is evident that economic diversification is progressing slowly and is led by the service sector. While industry, including mining and manufacturing, is vital for the continent's development, it has been observed that the value added by services has been essential to sustaining economic growth, especially in recent years (Otsubo and Otchia 2020). One explanation for this positive outcome is that the main components of services, including those related to trade, transport, and telecommunications, are indirectly linked to mining activities, mainly those involving copper, zinc, and cobalt. Newfarmer, Page, and Tarp (2018) have argued that the future of Africa lies in the service sector because of the emergence of industries without smokestacks, such as agro-industrial and horticultural value chains, tourism, and business and trade services (including information and communications (ICT)-based services and transport and logistics). The importance of the service sector to GDP is increasingly becoming apparent in developing countries, but at lower levels of the GDP. This phenomenon is well-known and resembles premature deindustrialisation.

2.4. Premature deindustrialisation

The classic, dominant view relates industry to the manufacturing sector because of its role as an engine of economic growth (Chenery *et al.* 1986, Kaldor 1966). Historically, rapid, sustained economic growth was highly correlated with an expansion in manufacturing and the reallocation of resources to more-productive activities (McMillan and Rodrik 2011). Manufacturing has faster productivity growth than the service sector and agriculture, pays higher wages, and has strong spill over effects on other sectors. This means that a rapidly growing manufacturing sector enhances productivity growth in other sectors of the economy, leading to higher economic growth overall.

To present stylised facts on structural change and premature deindustrialisation in Africa, Figure 6 includes a comparison of the manufacturing value-added (panel A) and employment (panel B) patterns of climbing and non-climbing countries in the period from 1960-2018. The results demonstrate different patterns. The first striking observation is that climbing countries are the only group in which the share of the GDP attributed to manufacturing has been increasing over time. The trend accelerated in the 1980s but decelerated in the 2000s. In contrast, non-climbing countries have experienced falling value-added manufacturing shares at a lower level of GDP per capita without reaching the peak share of 0.4, as documented in the literature (Otsubo and Otchia 2020). The share accounted for by manufacturing increased in the 1970s for non-climbing countries and then decreased. As a result, many developing countries' manufacturing sectors have remained extremely small and inadequate for generating productive employment. Deindustrialisation has reduced the potential for overall economic growth to generate employment and reduce poverty. For instance, the share of manufacturing-sector employment in non-climbing countries has been falling over time. In contrast, in climbing countries, the share of

manufacturing-sector employment reflected a rising trend from the 1960s-1990s before steadily dropping. The premature decline of manufacturing and the subsequent growing importance of the service sector in both developed and developing countries provides ample evidence that structural transformation has occurred at the boundaries of the manufacturing industry where the service sector has expanded due to technological innovation.

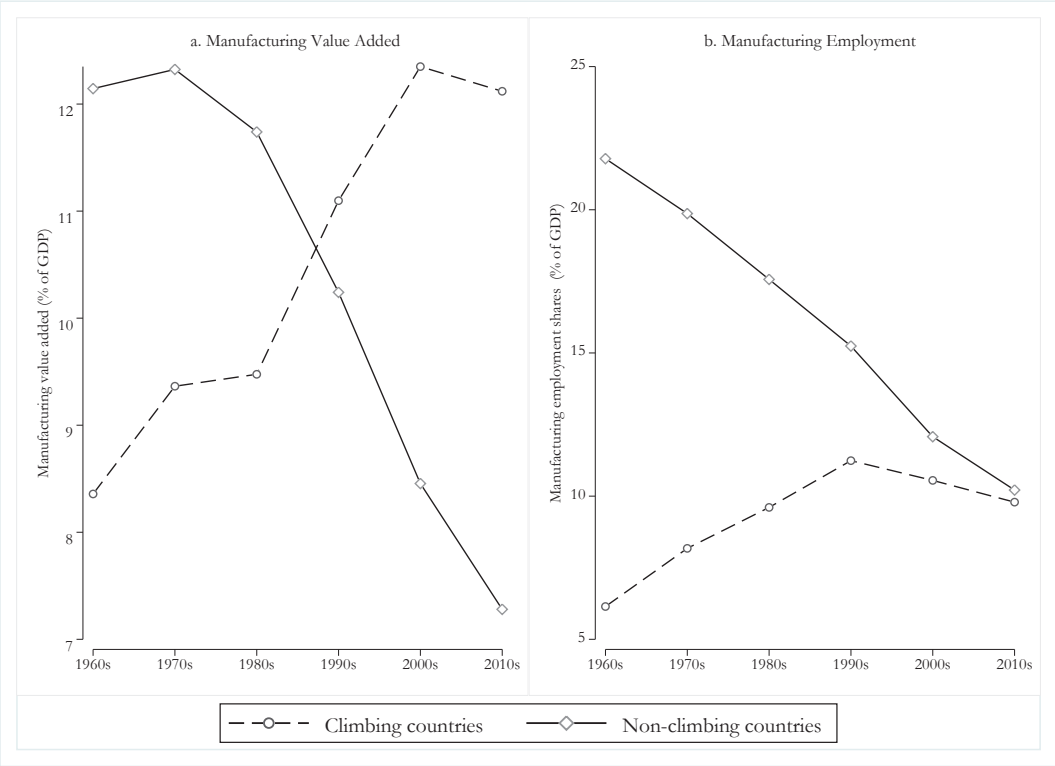

Figure 6. Premature deindustrialisation in climbing and non-climbing countries

Source: author's calculations based on the Word Development Indicators.

3. Methodology and data

To identify the characteristics of climbing countries, we employed a simple specification of a standard growth equation, also known as the Barro regression (Barro 1991). Specifically, we estimated the following equation:

$$\gamma_i = \alpha + \beta X_i + \varepsilon_i, \quad (1)$$

where γ_i is either the climbing-country indicator or the growth rate of per-capita GDP since the year when each country reached the threshold of US $500. X_i represents the growth determinants. Following the guidance of the theory, and as it is typically done in a reduced form in the empirical growth literature, we included 16 variables representing the trade structure, institutions, demography, infrastructure, macroeconomic environment and policies, and economic structure of countries in the year prior to

reaching the threshold.

Equation 1 can be estimated using the ordinary least squares method because endogeneity is not a problem, as the explanatory variables are dated before the dependent one. An important concern in using OLS is uncertainty in selecting the growth determinants (Brock and Durlauf 2001, Temple 2000). Another concern involves omitted variables because of missing observations in the data from early years. For instance, our model does not include human capital, which is recognised as a determinant of growth in several theoretical models (Lucas 1988, Mankiw *et al.* 1992).

To partially take into account these fundamental issues in cross-country growth regressions, we adopted a model-averaging estimators (Magnus *et al.* 2010) strategy. Recent empirical growth literature has recently grown around the use of these models, mainly standard Bayesian Model Averaging (BMA). The growing literature has focused on the role of institutions in general (Lenkoski, Eicher, and Raftery 2014), property rights (Eicher and Newiak 2013), trade (Eicher and Kuenzel 2016), energy consumption (Camarero *et al.* 2015), government spending and savings (Jovanovic 2017), and natural resources (Arin and Braunfels 2018), among other topics. Other researchers have tested the existing theories of growth. For instance, Lenkoski *et al.* (2014) used two-stage BMA methodology to test the findings of Rodrik *et al.* (2004) and found support for more determinants of economic growth. Magnus *et al.* (2010) re-examined the data used by Sala-i-Martin *et al.* (2004) by accounting for many models with different instruments and growth determinants. They also found that carefully addressing a model's uncertainty led to better results.

The advantage of the BMA method is that it is a data-driven model in which uncertainties are carefully addressed. All combinations of X_i are estimated and a subset of explanatory variables that maximises the predictive power of the model is selected. The unconditional BMA estimates are then computed from a weighted average of the estimates of each of the possible models in the model space, with the weights measured by the posterior model's probabilities. The weights are chosen according to the models' fitness so that models that better explain the data have a greater weight and, thus, a greater impact on the results. The BMA, therefore, produces unconditional estimates in the sense that they do not depend on a single model. Instead, the BMA relies on the evidence provided by the data. We followed the tradition of selecting the variables with a posterior inclusion probability (PIP) of 0.50 or greater as the most important ones for the interpretation of the results. In the second step, we used the parsimonious model in an OLS regression containing the selected explanatory variables.

The data and their sources are listed in Table 2. The data on the annualised growth rates of the per-capita GDPs were calculated from the first year each country reached the threshold of US $500 until the last year available in the dataset, which was usually 2018. We constructed the institutional variable by considering the first principal components of civil liberties and political rights. The variables' demography was constructed in a similar manner by combining the fertility rate and dependence ratio.

The initial period values were used to avoid possible endogeneity issues. Table 3 shows the descriptive statistics of the data, with the climbing countries representing 33% of our sample.

Table 2. Description of data used in the regression analysis for countries that reached the US $500 threshold

Variables	Description	Source
Oil price	Oil price	World Bank Commodity Market
Mineral price	Mineral price	World Bank Commodity Market
Investment	Share of gross capital formation at current PPPs	Penn World Table
Foreign value added	Foreign value added	Eora MRIO
Domestic value added	Domestic value added	Eora MRIO
Colonial dependence	Colonial administrative status	Sachs and Warner (1997)
Investment price	Price level of capital formation, price level of USA GDP in 2011=1	Penn World Table
Trade openness	Openness to international trade	Penn World Table
Landlocked status	Dummy variable that is one if the country is landlocked	AfDB (2007)
Oil-rich status	Dummy variable that is one if the country is oil-rich	AfDB (2007)
Mineral-rich status	Dummy variable that is one if the country is mineral-rich	AfDB (2007)
Tropical location	Percentage of total land area in the tropics (between the Tropics of Capricorn and Cancer)	Gallup, Sachs, and Mellinger (1999)
Rural population growth	Rural population growth	World Development Indicators
Urban population growth	Urban population growth	World Development Indicators
Institutional status	PCA of the fertility rate and dependence ratio	Freedom House
Demography	PCA of civil liberties and political rights	World Development

		Indicators
Log GDP per capita	Log of per-capita GDP in 1960	World Development Indicators
Life expectancy	Life expectancy (1960)	World Development Indicators

Table 3. Descriptive statistics of the data used in the regression analysis

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
Growth rate	47	1.29	1.74	-1.6	6.6
Climbing country status	47	0.33	0.48	0	1
Oil price	47	80.89	11.10	44.7	98.9
Mineral price	47	59.38	14.32	35.9	91.7
Investment	41	0.20	0.14	0.0	0.6
Foreign value added	40	9.71	5.17	0	17.5
Domestic value added	40	11.28	5.55	0	19.0
Colonial dependence	43	0.12	0.32	0	1
Investment price	41	0.30	0.35	0.0	2.1
Trade openness	41	-0.05	0.09	-0.5	0.1
Landlocked status	47	0.31	0.47	0	1
Oil-rich status	47	0.19	0.39	0	1
Mineral-rich status	47	0.21	0.41	0	1
Tropical location	43	0.89	0.28	0	1
Rural population growth	41	1.98	0.83	0.0	4.7
Urban population growth	41	5.79	2.82	1.1	16.6
Institutional status	42	0.00	1.38	-2.8	2.0
Demography	41	0.00	1.24	-3.5	2.0
Log GDP per capita	42	6.81	0.67	6.2	8.4
Life expectancy	39	3.73	0.13	3.5	4.1

4. Results

Columns 1-2 in Table 4 include estimates of the specifications of Equation 1 using the dummy of ‘climbing countries’ as our dependent variable. Columns 1 reports the posterior means, and Column 2 the PIPs. The findings reveal that mineral prices are a significant explanatory variable of growth, as their inclusion probability is the highest. The second significant determinant is the oil price. We find that

natural resource endowment, a proxy for oil- and mineral rich-countries, is a weak driver of climbing countries' status. The effect of the mineral price is positive, whereas the effect of the oil price is negative, but the magnitude of the latter is slightly higher and not statistically different from zero. Nonetheless, the fact that the price of natural resources is a significant explanatory variable of growth can be interpreted in favour of resource-dependent growth.

The effect of countries' participation in global value chains (GVCs) on their likelihood of climbing is also robust but less precisely estimated. The effect of the foreign value-added component is positive, but the domestic value-added component has a negative effect on a country's likelihood of climbing. Notably, the effect of trade is also positive, but it is not robust. Taken at face value, this finding suggests that the robust, strong positive effect of trade on growth works through backward and forward GVC participation. The negative effect of the domestic value-added component corroborates the findings of Dollar *et al.* (2019), who argued that the ratio of the domestic value-added component to the gross export value tends to fall as a developing country moves from the export of primary products to the that of manufactured goods and services via GVCs. The positive effect of the domestic value-added component on a country's likelihood of climbing implies that African countries are increasingly upgrading their technology because of increased integration into international production networks. The literature has cited China as the only country to achieve a simultaneous increase in domestic value-added exports and a high GDP growth rate due to a substantial improvement in technology and reduced trade costs. However, this is not the case in Africa, as most countries are confined to commodities-related value chains (World Bank 2020). Therefore, the presence of a negative sign seems plausible within our context, as imported intermediate inputs and services are key to encouraging value-added economic growth.

Our model also supports the relevance of initial GDP per capita and life expectancy. We found that the effects of initial GDP per capita and life expectancy were robust and precisely estimated. We found that the other variables were not robust determinants of climbing status. However, some findings are worth noting. First, we found that having a tropical location had a negative effect on climbing status, as suggested by Masters and McMillan (2001) and Hsiang and Meng (2015). Contrary to widespread beliefs, we found a positive effect of urban population growth on climbing status and a negative effect (less robust) of rural growth on it.

Columns 3-4 of Table 4 show the BMA results for the annualised GDP per-capita growth rate. If anything, the results confirm the importance of mineral prices in explaining economic growth in Africa, given that it has a posterior inclusion probability of 0.87. The other findings were qualitatively verified, but the estimates were not precise.

We will now turn our attention to parsimonious analysis by applying a regression model to the most robust determinant of climbing status and growth obtained from the BMA exercise. Since the BMA provided some data-driven intuition for the correct model, OLS regression seemed appropriate for

situations in which a small number of pre-determined variables existed. Columns 5-6 of Table 4 present the regression results when the dependent variable was climbing status. We focused on initial GDP per capita, life expectancy, oil price, mineral price, and the foreign and domestic value-added component for several reasons. By focusing on such variables, we had the ability to confidently determine that the regression model had sufficient degrees of freedom to assess the robustness of our results. Moreover, we had the ability to compare our findings to the estimates available in the literature. As expected, all the variables were statistically significant because of the robustness and flexibility of the BMA. Thus, the OLS results confirmed the previous findings that commodities prices, GVC participation, and initial conditions were likely the key drivers of climbing status. One important message communicated by this table was that the magnitude of the oil prices was much larger than that of the mineral prices. In Columns 7-8, we focused on the model estimating the annualised growth rate based on the three variables we identified from the BMA model, namely life expectancy, mineral prices, and foreign as well as domestic value-added factors in gross exports. We found that all the variables were statistically significant with the expected signs.

Table 4. Factors explaining the success of climbing countries

Dependent variable	Climbing country status		Growth rate		Climbing country status		Growth rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coefficient	Posterior Inclusion Probability	Coefficient	Posterior Inclusion Probability	Coefficient	Standard error	Coefficient	Standard error
Oil price	-0.0211	0.74	-0.0163	0.25	-0.030***	(0.006)		
Mineral price	0.0202	0.90	0.0621	0.87	0.023***	(0.006)	0.074***	(0.022)
Investment	0.0079	0.06	0.2832	0.12				
Foreign value added	0.0503	0.49	0.0243	0.15	0.113***	(0.023)	0.258*	(0.145)
Domestic value added	-0.0404	0.46	-0.0400	0.23	-0.093***	(0.021)	-0.297**	(0.131)
Colonial dependence	0.0094	0.10	0.0340	0.08				
Investment price	0.0121	0.10	0.1193	0.13				
Trade openness	0.0054	0.06	0.0079	0.06				
Landlocked status	0.0143	0.10	0.0676	0.11				
Oil-rich status	-0.0010	0.06	0.0394	0.08				
Mineral-rich status	0.0027	0.07	0.0067	0.06				

Dependent variable	Climbing country status		Growth rate		Climbing country status		Growth rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tropical location	-0.1031	0.26	-0.0486	0.08				
Rural population growth	-0.0060	0.09	-0.0785	0.17				
Urban population growth	0.0097	0.26	0.0952	0.45				
Institutional status	0.0045	0.10	0.0017	0.06				
Demography	0.0036	0.09	-0.0296	0.12				
Log GDP per capita	-0.2543	1.00	-0.3679	1.00	-0.248*	(0.134)		
Life expectancy	1.8019	1.00	7.0055	1.00	1.825***	(0.479)	6.411***	(1.980)
Constant	-4.1862	1.00	-24.9850	1.00	-3.764***	(1.319)	-21.371***	(6.419)
Estimation method	BMA		BMA		OLS		OLS	
Observations	36		36		36		36	
R-squared					0.716		0.575	

Note: This table reports the determinants of the success of climbing countries obtained from several regressions. In columns 1, 2, 5, and 6, the dependent variable is a dummy variable that takes 1 for climbing countries and 0 for non-climbing countries. In Columns 3, 4, 7, and 8, the annualised growth rate is used as the dependent variable.

5. Relation to the literature

In sum, we can report two major findings: we found that mineral and oil prices had a high probability of explaining countries' climbing status and that the nature of participation in the GVC mattered more than simple exposure to international trade. How do our findings relate to the literature, then?

Previous research (Alexeev and Conrad 2009, Lederman and Maloney 2007, Sachs and Warner 1995) provides a theoretical and empirical analysis of the relationship between commodity prices and economic growth. However, there is an ongoing debate about the interaction between commodity prices and economic performance due to mixed empirical results. Under various hypotheses regarding the nature of a country's endowment (Akinlo and Apanisile 2010, Eggoh *et al.* 2011) and its short- or long-term prospects (Bashiri Behmiri and Pires Manso 2013, Nkomo 2006, Otchia 2019), higher commodity prices will either have a positive effect on net-exporting countries or a negative effect on net-importing ones. Starting with an analysis of oil prices, Gbatu *et al.* (2017) found that, in Liberia, increased oil prices have not been detrimental to economic growth because of the reallocation of labour and capital

into oil-intensive sectors during the price boom. Other studies conducted in net-oil-importing countries have shown positive short-term effects on growth. While there is abundant literature describing the effect of oil prices on growth, few researchers have examined the effects of oil prices on the various phases of business cycles. One study by Balcilar *et al.* (2017) showed that net importers of oil, such as South Africa, can be expected to be vulnerable to oil price shocks irrespective of the phase of the business cycle. Most of these studies used oil price data from the 1970s. Research using a longer series from the United States (Gadea *et al.* 2016) showed evidence of nonlinearity in the relationship between oil prices and economic growth. While our data do not reflect this evidence, our study makes a significant contribution to the literature, as we used price data from 1960 to explain long-term growth.

Other studies have shown the relationship between mineral prices and economic growth in Africa (Deaton 1999). Perhaps the most comparable study to ours was done by Foster-McGregor *et al.* (2018). By separating energy from non-energy prices, they found that the former had a significant long-term resource curse effect, while increased non-energy commodity prices raised the long-term GDP per capita. Our findings on the positive effect on mineral prices are important for several reasons. They provide deeper insight into the debate on whether Africa should adopt a comparative advantage-defying strategy or promote industries that correspond to its countries' current endowment structures (Lin and Chang 2009, Otchia 2015). Our findings showing that mineral prices positively affect economic growth suggest that development strategies for the continent should make natural resources more inclusive by better managing revenues from them and from exchange rates (Otchia and Asongu 2020, Sala-i-Martin and Subramanian 2013).

By analysing the foreign and domestic value-added component of exports, we have written a paper that belongs to an emerging strand of literature examining the effects of trade in value-added commodities on economic growth. For example, World Bank (2020) showed that most of the recent poverty reduction throughout the world is strongly linked to the GVC participation of a few countries (China, Vietnam, and Bangladesh). In Africa, however, the rates of inequality and poverty have increased despite increased participation in GVCs. Otsubo and Otchia (2020) pointed out that the inter-country dispersion of the impact of GVCs can be persistent because African countries are confined to the low-value-added commodities segments of value chains without much prospect for industry upgrades. This study shows that Africa can succeed in GVCs by reducing the domestic value-added component in exports and increasing foreign value-added exports through imports of sophisticated intermediate inputs.

6. Conclusion

In this paper, we investigated the link between policies, institutions, and endowments and economic growth in Africa. To analyse this relationship, we proposed a simple, intuitive methodology to identify

climbing countries as those marked by sustained, high levels of economic growth compared to other countries with similar per capita GDPs. The advantages of our approach were that we could accommodate various thresholds above which we defined success and various indicators, such as manufacturing shares of GDP. We showed that 33% of countries were climbing the ladder of economic development, while the rest of the countries were either stagnant or experienced negative economic growth. The climbing countries exhibited positive structural changes and did not experience premature deindustrialisation.

We shed new light on the determinants of climbing status and sustained increases in economic growth. We found that mineral and oil prices were strong determinants of climbing status. We also found that oil prices had a negative effect on growth and that policies that fostered structural change helped mitigate these effects. We also showed that the type of participation in GVCs mattered more than simple trade-openness measures. Our results suggest that African countries can sustain high growth rates by reducing the domestic value-added component of exports and increasing the foreign value-added one. Finally, our findings supported the existing evidence on the role of initial GDP per capita and life expectancy in this phenomenon. Taken together, our findings imply that the role of policies and endowments is especially important in creating champions in Africa.

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