

Engines of Growth and Africa's Economic Performance Revisited

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The original version of this Chapter was written in the late 1990's and originally published in 2003. In it, I reviewed the growth literature of the time and discussed the extent to which it illuminates the growth performance of Africa. Having looked at it again some twenty years later, I find that much of my original analysis still stands. But the literature has continued to evolve and new ideas have come to the fore that refine my original synthesis. Revising my original Chapter to incorporate the new material would have resulted in a text that was much too long to fit in this book. Instead I have opted to write an entirely new Chapter that focuses exclusively on issues that were not covered in the 2003 version. I also take advantage of this opportunity to actualize my predictions regarding the economic future of the African continent.

Introduction

Nearly twenty years have passed since I wrote my original contribution to this book. Much of what I wrote then still stands.¹ But the literature – and the world – have continued to evolve. The purpose of this new Chapter is to present new ideas that I find most relevant for this volume, and to discuss how they can be articulated with what I wrote earlier. As in my original chapter, I discuss the extent to which these new developments help us understand the past and present economic performance of the African continent -- and what future trajectory they predict.

I do my best to introduce new ideas in an order that approximately follows the order of my original presentation, although some of them cut across multiple sections. I start by discussing investment in physical capital, focusing on infrastructure and its relationship with the generation of agglomeration effects and gains from trade. Next I revisit the role of human capital and education in the growth process, with a particular emphasis on biased technological change and R&D productivity. I then look at variation in productivity across firms, and introduce the new economic literature on management and business practices -- including its application to governmental bureaucracies, which it typically filed under the heading of 'governance'. I then provide a rapid overview of the literature on institutions and culture, and how it relates to the rest of my presentation. To round things up, I end with a discussion of population growth and migrations, two topics that have large implications for

¹ To illustrate, most of the themes that I discussed are also those covered in detail in Acemoglu's (2009) seminal textbook on modern economic growth.

growth projections in Africa and elsewhere. I wrap things up with concluding remarks that include a brief discussion of orphan topics in my original presentation, such as conflicts and poverty.

Infrastructure investment and agglomeration effects

Over the last twenty years, there has been a growing recognition that economies of agglomeration play an important role in the development process. Towns and cities are the most visible manifestation of agglomeration externalities, and they foster -- and feed on -- those economic activities that benefit from being in close proximity to each other. One example of such activity is production for the market by small entrepreneurs. In African villages, people produce most of what they consume -- not just food, but also housing, insurance, entertainment, child and elderly care, and personal services such as haircuts or bicycle repair.

In towns and cities, these goods and services can be produced by specialized producers and sold through the market, thereby allowing gains from specialization. Rapid urbanization in Africa has been facilitated by this process, which has seen the emergence of a myriad of microenterprises in what is commonly called the 'informal sector'. What has made this possible is what some have called the 'entrepreneurship revolution', that is, the transition from non-market exchange within the village or lineage, to cash-and-carry market exchange in newly formed agglomeration (e.g., Fafchamps 2011). This transition itself is a form of innovation, and it has required many changes in institutions and aspirations, a point that I revisit below.

The size of cities is largely determined by the geographical space they can serve (e.g., Fafchamps 2012), and this space is shaped by infrastructure: the existence of navigable bodies of water nearby, as well as investment in roads and railroads extend the reach of cities and allow them to prosper. This was true in the distant past (e.g., Kerem 2017, Blaydes and Paik 2016). It also true more recently (e.g., Donaldson 2017, Jedwab et al. 2015a, 2015b). The same conclusion comes out of a large literature that uses gravity equations to study trade across different parts of the world: distance matters for trade, but in a way that is shaped by transport costs -- and thus by investments in transport infrastructure. Transport costs and trade also affect the diffusion of new technologies (e.g., Desmet and Rossi-Hansberg 2014). The implications of this body of work have already been taken into account by African policy makers, who display a renewed interest in making large investments in road and railroad infrastructure -- often with Chinese backing.

Agglomeration effects can also arise over communication networks, with similar implications: to benefit from these externalities, investments have to be made in communication technology. The rapid rise of mobile phones throughout Africa has undoubtedly brought the continent closer together in ways that could not have been imagined twenty years ago. The literature has also brought to light the role of language as facilitators of growth and trade in goods and especially services (e.g., Desmet et al. 2012). In this respect, many African countries can expect to benefit from their familiarity with world languages such as English, French, and Portuguese. The recent

emergence of call centers in Dakar is a good example of a new development facilitated by familiarity with a world language. Some African languages -- e.g., Swahili, Hausa, Lingala -- have also experienced an expansion of the geographical area over which they are used as language of commerce within the continent. In time, familiarity with these languages will facilitate trade and benefit those along the newly formed trade routes.

Human capital and biased technological change

In my original chapter, I pointed out that the accumulation of human capital cannot, by itself, generate persistent growth because the accumulation of human capital by individual workers takes time, and people's lives are finite. I nonetheless emphasized that skilled workers are often required to operate new machinery and to interact with management in new and more efficient ways.

The last twenty years have seen a rapid increase in education in many countries, which many predicted would increase prosperity for all. Over the same period, however, wages disparities have grown and the labor share of national income has shrunk. In many developed countries, the real wages of the majority of workers today are equal to -- or lower than -- what they were three decades ago. The same phenomenon has been documented in middle income countries as well. What can account for this disappointing outcome?

Grossman et al. (2017) offer one possible explanation. Their starting point is that, as an input in the production process, human capital is a complement to physical capital so that capital accumulation raises the return to schooling more than it raises the return to pure labor. When the growth of productivity and wages slows down, the discount rate drops and this makes staying in school more attractive than working. As a result, the education level of workers rises. When human capital is more complementary to physical capital than to raw labor, the increase in schooling triggered by a productivity slowdown triggers a greater relative demand for capital; and hence a redistribution of income from labor to capital.

If we apply this model to Africa, it predicts that the increase in education that we have observed is partly attributable to low productivity growth that makes leaving school in order to work less attractive for students. It also implies that capital investment should subsequently follow to employ the newly educated labor force. How quickly this process can materialize is hard to tell, however. Moreover, the strong complementarity between human and physical capital assumed by the model implies a shrinking demand for uneducated labor, and hence a fall in their relative wage.²

This raises the question of why human and physical capital are strong complements. As pointed out by Acemoglu (2009, chapter 15), this was not always the case: technological change was biased towards unskilled workers in the 19th century. It is only over the 20th century that it has generally been skill biased. In other words, the strong complementarity between human and physical capital is a relatively recent feature of technology.

² This process could be further accelerated by technological change biased in favor of capital, such as robotization and AI.

Acemoglu argues that this is probably due to an induced innovation effect: as skilled labor became cheaper and more readily available, it became beneficial to invent new technologies (e.g., computerized equipment) that take advantage of a skilled labor force. As demonstrated by Grossman et al. (2017) and others, such a process has the undesirable long-term consequence of increasing wage inequality and of reducing the share of labor in national income. Once skill-biased technological change has been introduced in developed countries, however, it produces a treadmill effect for less developed countries: in order to compete, workers there must be able to use up-to-date machinery and production methods, and this requires an educated labor force. Later we will revisit the implications of this unequalizing process on economic and political prospects in Africa.

In my original chapter, I emphasized that long-term increases in prosperity require innovations that make the economy more productive. Continued growth thus requires that the world to produce innovations at a rhythm sufficient to fuel productivity increase. A recent paper by Bloom and Jones (2017) offers evidence suggesting that, over time, the productivity of R&D has slowed down. This is demonstrated by showing that, in order to maintain a more or less constant rate of productivity growth over the last few decades, the number of researchers has increased exponentially. Since we cannot continue to exponentially expand R&D expenditures at the same rate, the authors predict a slowing down of productivity growth -- and thus of growth itself. How quickly this innovation frontier will become constraining is yet unclear. What is clear, however, is that countries with a young educated population will be better positioned to attract new workers into research so as to produce the large amounts of R&D that will be required to sustain growth.

Organizations and management practices

Growth ultimately comes from innovations that increase productivity and are made possible by the accumulation of knowledge. In my original chapter, I emphasized sources of increased productivity coming from new consumer products and from technological change embodied in machinery and equipment. This ignored innovations in forms of organization and in management practices, a lacuna that I now correct.

These innovations include practices internal to the firm (e.g., the assembly line, quality control, CEO stock options) as well as ways by which the firm interacts with the rest of the economy to secure inputs (e.g., just-in-time delivery), finance (e.g., initial coin offering), and labor (e.g., recruiting through LinkedIn). Similar observations apply to governmental bureaucracies and the NGO sector: they too benefit from improved management practices. Coming up with better management practices and organization forms is what economists, jurists, and management consultants are all about.

Since the seminal work of Melitz (2003), there has been an increased awareness that aggregate productivity in an economy is nothing but the average productivity of its individual firms and organizations. The corollary is that, in order to grow, an economy must have more productive firms on average -- which can be

achieved through the exit of unproductive firms and entry by productive firms. In various publications, Bloom and Van Reenen and coauthors (2007, 2010) have documented the wide productivity disparities across firms in all countries, as well as the fact that these disparities tend to be larger in developing countries -- where a long tail of low productivity firms that manage to coexist with much more productive firms (e.g., Bloom et al. 2014). This suggests that, unlike new products and machinery, innovations in management practices do not diffuse evenly across an economy. This even applies to simple, well-established practices (e.g., Fafchamps and Soderbom 2014).

This raises two questions: how can less productive firms survive; and what makes some firms more productive. There is no definite answer to the first question but in Fafchamps (1994) I list a number of ways by which small, low productivity firms can exploit specific cost or market advantages in order to remain afloat. Of course, many of these firms do not survive for long -- among microenterprises, entry and exit rates are high.

We have more information regarding the second question. Leadership seems to matter, both in private and government organizations. Entrepreneurship has attracted much attention, including the study of variation in entrepreneurship quality across countries and sectors. Some have argued that the relative success of particular ethnic minorities in some countries can be linked to higher quality of entrepreneurship, which itself is due to familiarity with better management practices either through education or family background. This point has also been noted by economic historians (e.g., Greif 1993, 1994) and is particularly noticeable when it benefits expatriate communities (e.g., Jews and Armenians in Europe and the Middle East from the years 1400 to 1800 -- see Braudel 1986; the Syro-Lebanese and South Asians in Africa today; and the Chinese in South East Asia). But it can also apply to domestic ethnic groups (e.g., Fafchamps 2004). Similar principles can explain why multinationals can perform better than domestic firms, e.g., by taking advantage of better familiarity with the innovation opportunities in management that are offered by a new technology such as IT (Bloom et al. 2012a). Some attempts have been made at improving the management practices of firms without changing their managers (e.g., Bloom et al. 2013). Results have been muted in terms of cost-benefit analysis. A more promising avenue is probably to change managers -- e.g., by exposing firms to LBO's and the like, or by encouraging firm entry.

Much of the economic literature on management practices has so far focused on adoption and usage by individual firms. Less has been done regarding patterns of diffusion across firms. This fails to recognize that many management practices are either strategic complements or strategic substitutes across firms. For instance, if a firm provides vocational training to its workers, nearby firms can poach these workers instead of offering their own training (e.g., Fafchamps and Soderbom 2014). This in turn hinders the adoption and diffusion of vocational training among firms.

In other cases, practices are strategic complements across firms. When this is true, diffusion is particularly problematic when a practice only provides benefits when a majority of firms adopt. For instance, if some firms sell branded high-quality products and these branded products are successfully copied by low-quality producers, firms have no incentive to improve quality. Hence the reputational benefits of branding are not achieved, keeping

productivity low. Much of my work on these topics is summarized in Fafchamps (2004).

There also exists a large literature on management practices in government and civil service -- usually referred to as 'governance'. Much recent research in development economics aims to identify and disseminate better management practices within government bureaucracies in developing countries. Examples of this work include Duflo et al. (2012) on using digital cameras to monitor absenteeism among teachers, Duflo et al. (2011) on teacher tracking, and Duflo et al. (2013) on how to incentivize public auditors of firm pollution in India. Banerjee and Duflo (2011) provide a cogent introduction to this large literature, its ultimate objective, and its reliance on randomized controlled trials (RCT). For our purpose, it is important to realize that the introduction of RCTs to improve public service delivery is akin to the introduction of agronomic field trials to improve crop productivity: it is the application of statistical methods to the identification and discovery of better practices. As such, the whole endeavor partakes to the same process that we have discussed for private firms, namely: the application of scientific knowledge to the production of innovations that raise productivity -- in this case, in the provision of public goods.

Institutions and culture

Institutions are typically defined as the 'rules of the game' defining the action set of economic agents as they interact across or within firms and organizations (e.g., North 1973, 1990). They can be seen as the meta-organizational structure within which economic exchange takes place. This structure typically encompasses the legal system (i.e., laws and regulations, courts, enforcement agencies) as well as various formal institutions such as the Central Bank, the Treasury, and the immigration service. Informal institutions also play a big role. These include practices, expectations and beliefs that shape the way economic agents deal with each other.

Economists' interest in institutions has often focused on trust and its implication regarding contract enforcement and the way markets work (or fail to work effectively). There is a large literature on this topic.³ It shows that formal and informal institutions affect economic performance and are one of the determinants of productivity differentials across countries (e.g., Bloom et al. 2012b). Given the role that institutions play in economic performance, we would like to know how poor institutions can be replaced by better ones.

With respect to formal institutions, the answer is easy. What defines formal institutions is precisely the fact that they are created through a well-defined procedure and a similar procedure can be used to change them. For instance, in Common Law, a judge can adjudicate a court case in a way that does not follow judicial precedent. If other judges follow suit, the judicial principle on which adjudication was based has been changed. In Civil Law countries, this process is even simpler: Parliament passes a new law, and all courts now have to adjudicate on the basis of the new law. One could even argue that the introduction of Civil Law at the time of the

³ The reader is referred to Fafchamps (2004, 2011, 2012, and 2017), for a detailed examination of this literature.

French revolution was itself an innovation, the purpose of which was precisely to facilitate change in formal institutions and subordinate the discretion of judges to the democratic will. All modern states have a formal process by which laws can be changed, and they adjudicate court cases based on these laws.

While changing the letter of the law is relatively easy, ensuring that the law is applied can be difficult when the change in formal institutions creates a mismatch or conflict with existing informal institutions. This mismatch can actually last a long time. For instance, according to Sharia law, a daughter should inherit a third of what a son receives. Yet this prescription is seldom applied by Koranic courts, especially in agrarian societies (e.g., Platteau 2008; Kuran 2011). The same observation applies to efforts by modern African states to empower women in ways that conflict with their subordinate social status (e.g., Platteau 2000; Aldashev et al. 2012).

This raises the question of whether informal institutions based on tradition can ever change. This, as the reader may already realize, is a sensitive question. Let me first use Christmas as a less emotionally charged example to make two simple points. As it is currently celebrated, Christmas involves a Christmas tree and Santa Claus. To parents and children the world over, these two features feel as if they are steeped in age-old tradition. This could not be further from the truth: Christmas trees and Santa Claus on a sleigh are forms of Christmas decoration introduced by US department stores in the 1950's as part of their window displays. They rapidly caught on and by the late 1960's they had become near universal symbols of Christmas. This shows that tradition can change rapidly, and still be perceived as immemorial. It also shows that success in changing tradition is difficult to predict or manipulate: department stores have introduced many other changes in their window displays over the years, and these have not been quite as successful.

Even though this example shows that tradition can change rapidly, what the economic literature has emphasized instead is the strong persistence of informal institutions over a long period. This persistence probably has something to do with the way that informal institutions are enforced, i.e., through peer pressure and the internalization of social norms. Wahhaj (2017) articulates this idea theoretically and distills its implication for institutional change. He shows that, when people use others' behavior to infer whether a social norm is still in force, it is possible to account for both the persistence of social norms over a long period and their sudden unraveling, as well as for more gradual evolution. The author illustrates how this model can account for the persistence of low labor market participation among women in Bangladesh.

Because there is no clear mechanism by which social norms can be purposefully changed, they are not easily amenable to policy. This does not mean that they do not respond to changes in economic conditions. Fisman and Miguel (2007) show that corruption levels in their home country predict how many parking tickets UN diplomats receive in New York. They interpret this evidence as suggesting a persistence of corrupt practices abroad. Barr and Serra (2010) provide a counter-example from a bribery experiment. They too find that corruption in the home country predicts bribery in the lab; but the effect declines with the length of time subjects spent in the UK, suggesting that social norms gradually adapt to the environment.

The literature has also emphasized the link between informal institutions and very persistent aspects of culture, such as language (Desmet et al. 2012). For instance, Chen (2013) shows that languages that grammatically associate the future and the present foster behavioral norms that are future-oriented: speakers of such languages save more, retire with more wealth, smoke less, practice safer sex, and are less obese. This holds both across countries and within countries when comparing demographically similar native households. Others have noted that, over centuries, human groups have adapted to their ecology by adopting specific productive activities and the institutions that support them. For instance, Alesina et al. (2013) note that areas suitable for plough cultivation requires a more centralized form of household production. As a result, they developed – and maintain to this day – strong gender roles and a subordinate role for women. In a similar vein Alesina et al. (2015) and Greif and Iygun (2013) emphasize the long-term implications of the strength of family ties on labor regulation and growth.

Gorodnichenko and Roland (2017) go one step further and link the level of individualism-collectivism of different cultures to their long-run growth performance. The authors further demonstrate that this important aspect of culture can be predicted by genetic data -- and they use this fact to construct an instrument for individualism-collectivism (see also Giuliano and Nunn 2017). Similar efforts have focused on differences among ethnic groups, defined based on the spatial distribution of languages and dialects of the distant past (e.g., Alesina and La Ferrara 2005).

While the above body of work seeks to identify the persistent effect of cultural features from the distant past, other authors have focused on the legacy of specific historical events on subsequent growth performance. Here are a few examples of historical events that have been associated with later economic performance: the Atlantic slave trade (Nunn 2008, Nunn and Wantchekon 2011, Fenske and Kala 2017); pre-colonial African states (Lowes et al. 2017) and European city-states (Guiso et al. 2016); African colonial experience (Dev et al. 2016); and the location of sugar processing plants (Dell and Olken 2017) and Vietnam bombings (e.g., Miguel and Roland 2011).

Before closing this long section on institutions and culture, I would like to make three important remarks. First, the fact that differences in culture, ethnicity, language, or history predict subsequent economic performance should *not* be construed as implying determinism: not only are the documented effects often small in magnitude, they never are a perfect predictor. There remains a lot of unexplained variation in economic performance over and beyond what is predicted by culture, institutions, and history. This important observation is best illustrated with an analogy: observing that women are less likely to enroll in a STEM major⁴ at university does not imply that women cannot be successful in those subjects. This is because there is a lot of idiosyncratic variation within each gender. The same is true for people sharing the same culture, ethnicity, or language.

⁴ Science, Technology, Engineering and Mathematics.

Secondly, the fact that past differences in ethnicity, language, or genetics help predict economic outcomes of people occupying the same location or social position years later does *not* imply that the effect operates through ethnicity, language or genetics. The research discussed here suggests instead that past differences are correlated with culture and institutions, and culture and institutions are persistent over time. Why they are persistent probably involves a combination of peer pressure, conformism, and self-identity -- combined with the persistence of the socioeconomic and ecological features that contributed to different institutions in the first place (e.g., Giuliano and Nunn 2017). As North (1973) and many others have demonstrated, culture and institutions do change, often slowly, and sometimes rapidly -- a property that is well accounted for by Wahhaj's (2017) already mentioned model.

Thirdly, the ethnic and genetic mix of human societies changes a lot over time. European societies, for instance, have experienced a lot of movement and mixing over time, within and across countries. This is even more true in Africa. If newcomers were to permanently preserve their original culture and institutions, the predictive power of the past ethnic and genetic makeup of the 'native' population would rapidly diminish. In order to maintain statistically significant predictive power, the culture and institutions of the native population must be gradually adopted by newcomers -- i.e., they integrate (e.g., Abramitzky et al. 2017). This is illustrated, for instance, by Barr and Serra (2010) for corruption.

The fact that newcomers can, to some extent, adopt the culture and institutions of their new residence suggests that they may also take aspects of it when they return to their place of origin. This is particularly relevant for Africa, given the large migratory flows involving Africans moving to Europe, North America, and the Middle East. Some African migrants stay there, but many return and bring with them not only new experiences with foreign institutions and practices, but also raised expectations regarding the quality of consumer goods and services, and these raised expectations encourage development (e.g., Dinkelman et al. 2017).

What next?

I end this all-too-short overview of the sources of economic prosperity with a discussion of what we can expect to observe over the rest of this century in Africa and elsewhere.

One macro-feature that is bound to affect how this century continues to unfold is the rapid population growth of Africa and the Middle East relative to all other parts of the world. By the end of this century, the world's population is forecasted to reach approximately 11 billion people in total (average forecast), and 4 billion in Africa (UN 2013). The Asian population will continue to increase until the middle of the century, but then will start to shrink. By the end of the century, population will be growing only in Africa and the Middle East. What this means is that, from 2050 onwards, only Africa and the Middle East will have an age distribution dominated

by young people. Elsewhere, the population will get older and a dwindling number of young workers will have to support an increasing number of ageing parents and grand parents.

This evolution is bound to have dramatic consequences on economic dynamism and innovation: young people are more adaptable to change than their elders; they are more predisposed to take risks and hence to innovate and be entrepreneurial; and they are at a point in their life when acquiring new skills is relatively easy and shifting career in response to circumstances is more likely to make economic sense. All these factors militate in favor of economic dynamism progressively shifting from ageing countries in Europe and East Asia towards young countries with a more dynamic population, a more innovative economy, and a lesser social burden.

In the meantime, however, the doubling of the African population between now and the middle of the century is bound to put enormous pressure on local governments to create jobs and economic opportunities. Not all African countries will be able to rise to the challenge, and we can expect large-scale humanitarian crises and inner civil strife in some places. The abundance of cheap labor relative to ageing parts of the world should, however, open a window of opportunity to attract to Africa mobile activities such as manufacturing and IT services. We can also expect growth in (potentially) labor intensive sectors such as agriculture and tourism, provided suitable innovations are made available and management skills upgraded. This transformation will require massive investments in infrastructure and technology, much of which will have to come from FDI. The countries that will do better are those that find a way to absorb rapid foreign investments and (probably) expatriate managers and investors without endangering their social and political fabric.

Those countries that are currently developed but have an ageing population will similarly have to decide whether they accept more young migrants from Africa and the Middle East. Desmet et al. (2016) present world-wide simulations of different global migration scenarios and their implications for relative prosperity by the end of the century. They show that, if Europe and North America close their borders to immigration, Africa will suffer initially but, by the end of the century, it will have overtaken the stultified economies of currently developed countries. In contrast, if Europe and North America open their doors to immigration, the mid-century forecast for Africa is much less bleak -- remittances will help increase welfare. In this scenario, Europe and North America are predicted to remain economically prosperous till the end of the century while Africa catches up to their level. Of course, simulations are based on assumptions and these assumptions can be questioned. But the work has the merit of forcing us to confront these choices and their far-reaching consequences.

Rapid development in Africa will occur at the same time that the continent continues to urbanize. I have argued that cities do not spring up anywhere, and once they have appeared at a particular place, returns to agglomeration help them attract an increasing number of activities and people. Secondary towns will also appear

in places that are now purely rural.⁵ This will generate a massive reorganization of people across space -- both within individual countries and across Africa as a whole.

An example of redistribution of people across space is studied by Bryan and Morten (2017). What we learn from this work -- and that of others -- is that, because people are heterogeneous in terms of skills and aspirations, they sort themselves across space. Some people possess skills that are valuable in activities benefiting from agglomeration externalities -- e.g., manufacturing, finance, industrial services, and commerce. These individuals are comparatively more productive in towns and cities, and over time they migrate there. Because their high wages fuel demand for better amenities, this pushes rents up. As a result, those with fewer skills find it difficult to live in modern, forward-looking cities -- and they recede to small towns and villages where rents are lower and they can more easily compete for jobs in agriculture, mining, or the non-tradable sector.

We can therefore anticipate strong economic divergence within Africa, and an increased polarization between large urban centers that catch up with the West, and small towns and rural areas that stagnate in their shadow. A similar divergence has been observed in Latin America and, more recently, in China. But it will probably be exacerbated by the recent increase in the complementarity between capital and human capital, which puts downwards pressure on the demand for unskilled workers. To the extent that the divergence between town and country is driven by the spatial sorting of skills and talent, pockets of poverty will not be amenable to market-based solution such as offering training or encouraging people to leave. Instead, it may be more efficient to support less fortunate individuals where they are. The South African pension system (e.g., Duflo 2000) is an example of such logic: pension payments to elderly women go primarily to rural areas where poor people live.

A rapidly growing population means a lot of young men and women. Not all of them have the ability or inclination to obtain a college degree. Spatial sorting will relegate them to small towns and poor rural areas. Undoubtedly, this will cause immense frustration and is likely to foster criminal activity and fuel civil strife -- as has been observed, for instance, in Latin America. To reduce the social and economic cost of crime and conflict, something must be done to employ young uneducated people -- especially young men because they more likely to turn to violent crime and to enroll in armed groups. One possible avenue is to employ them in constructing the many infrastructures that Africa sorely needs. This implies finding the management capacity and the financial means to implement such a massive public investment drive.

I have also argued that evidence suggests that the productivity of R&D has been declining. This means that, in order to generate the growth needed to bring Africa to the level of the rest of the world, a massive investment will be required in R&D and part of this investment burden will naturally have to be borne by Africa itself.

⁵ Which locations urbanize is another interesting question, which we do not have the time to cover here (see for instance Kerem 2017 and Fafchamps et al. 2016).

Let me conclude by noting that, after independence, African governments focused primarily on political sovereignty from colonial powers. Achieving this required sacrifices in terms of growth because, at the time, the population had a low general level of education and lacked a bureaucratic tradition, which made running large hierarchical organizations (e.g., government services) challenging. The learning curve was steep, and was made steeper by a relative reluctance to rely on imported human capital. For reasons that are not difficult to identify, African governments wanted to wrest economic and political control away from foreign interests and people of foreign extraction. They often proved to be willing to delay growth in order to achieve this outcome -- e.g., by nationalizing industries or expelling foreigners. This type of political expediency is certainly not unique to Africa. Yet I suspect that the experience of South Africa under apartheid served as repellent, as it offered a vivid image of the unequal and racially divided society that could arise if the continent would rely on skills and talent imported from the West. The alternative was to do (mostly) without imported skills and talent, even at the cost of temporary economic stagnation.

This era is now over and things have changed. Education levels among young Africans have risen steadily, we can observe the rise of an entrepreneurial class, and many countries have recently been enjoying high growth rates over extended periods of time.

I have drawn from a large and varied literature to present a number of insights that are relevant for those who wish to understand how growth and prosperity are likely to unfold in the next decades. To do so in a single chapter, I have taken a broad view and I have abstracted from the many differences between countries and regions. My focus has remained on documenting the strong forces that underlie growth and on applying my understanding of these forces to identifying challenges and opportunities to come, and to propose elements of a winning strategy.

In the long term, the news is good for Africa: abstracting from a possible cataclysmic event, the second half of the 21st century will mark the onset of Africa's century. By 2050, the continent will become the most dynamic and vibrant region of the world. Before then, however, nerves of steel will be needed to steer investment in the right direction. Those countries that are capable of doing so successfully will establish themselves at the core of Africa's growth miracle. The race is on.

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