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The superstar cities of Africa

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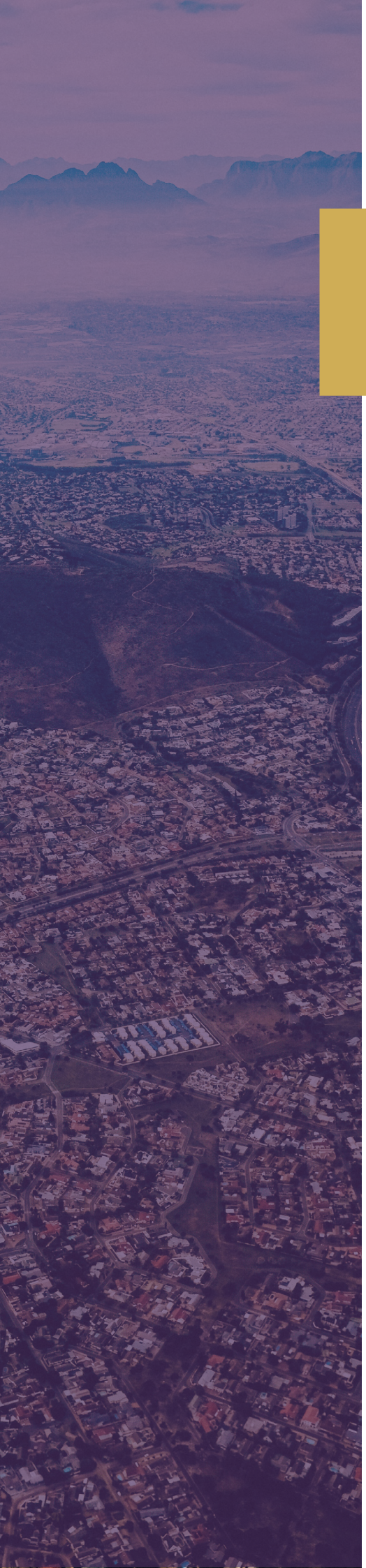

The superstar cities of Africa

Report written by

Sean Ellison

Research Manager – Business Development Services
Cushman & Wakefield

Editor

Kay Pitman

Thought leadership specialist

Supervising editor

John Ramshaw

WBEF manager

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Glossary

Agglomeration economy	A localised economy in which the concentration of complementary industries and services drives cost reductions and efficiency gains.
Clusters	'A geographical proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and externalities.' (Michael E. Porter, On Competition, 1985).
Decile	One of ten equal sized brackets into which a population can be grouped according to the distribution of a selected value – for instance, annual income.
Dominant city effect	The effect by which a city within a particular geography draws an outsized share of resources (human and capital) from elsewhere within said geography.
Economic concentration	The effect by which a small number of economic factors (businesses, cities, countries) account for an outsized proportion of economic activity within a particular market (city, country, continent).
Exogenous shock	Unexpected or unprepared for events, occurring or originating outside of a given industry or geography, that have repercussive effects for said industry or geography.
Knowledge-intensive	Industries in which the amount of revenue spent on research and industries development or new technology is higher than the norm.
Lower-income countries	Countries in which Gross National Income (GNI) per capita is less than US$1046, according to World Bank calculations (threshold correct as of July 2020).
National urban GDP	The overall proportion of national GDP concentrated within a country's urban economies.
Negative externality	The cost or other injury incurred by third parties resulting from the production, trade or consumption of certain goods between two parties.
Non-tradeable good	Goods that are not traded internationally, for which demand and supply exist within close geographic proximity, and for which values are low relative to volume.
Per capita GDP	The measurement of economic output per person within a country; calculated by dividing national GDP by total national population.
Social cohesion	'The capacity of a society to ensure the well-being of all its members, minimizing disparities and avoiding marginalization.' – Council of Europe, 2008.
Standard deviation	A statistic measuring the dispersion of a dataset relative to its mean.
Urbanisation	The measurement of how many people within a geographic region live in urban areas relative to the total population of the region.

Foreword

While the pain of the COVID-19 pandemic may have been shared across the world, it has not been shared evenly. At city, state and national level, existing inequities have been exacerbated. The gap between the haves and have-nots has widened furthest in those places where social disparity is most deeply entrenched. In Africa, home to roughly two-thirds of the world's extreme poor, the past 18 months have been especially exacting.

Continental GDP fell by 2.1% in 2020 – marking the first pan-African recession in 50 years. Long term scarring from the crisis (unemployment, skills deterioration and other drags on productivity) will hit low-income countries seven times harder than their high-income counterparts. And if those same low-income countries are to meet their UN Sustainable Development Goals by 2030, they will require financial support equivalent to 2.6% of global GDP. Clearly, they cannot raise this money alone.

There is, though, much cause for optimism regarding Africa's future. It can only be hoped that 2020 was a blip in an otherwise half-century long growth story. In their **Economic Outlook for 2021**, published in March of this year, the African Development Bank strikes a bullish tone about the prospect of an immediate and sustainable recovery. Already the world's youngest continent, by 2030 it will trail only Asia in the global urbanisation charts. Its cities are youthful, thriving and ambitious places. Some – the titular superstars of this report – make a spectacularly outsized contribution to the continental economy.

Urban centres are well established as the primary engine rooms of growth, opportunity and prosperity across the world. This is one of the few respects in which Africa is not exceptional. If the continent is to make good on its potential, the enormous promise of its superstar cities must be harnessed by public and private sector alike. This report does not represent a definitive document on which to base enabling policy or investment decisions in those cities. It is, nonetheless, a fresh resource for anyone interested in the economic and social progress of this marvellous and multifarious place. Accordingly, we are proud to introduce it to you and hope that you will enjoy reading it as much as we have enjoyed bringing it to life.

John Ramshaw

Manager

World Built Environment Forum

Executive summary

The study of individuals, firms, and industries that command an outsized share of economic output has been of increasing academic interest in recent decades. However, little attention has been given to the superstar characteristics visible in economic geography. This report aims to highlight the dynamics of economic concentration across cities in Africa. To do so, the Superstar City Statistic (SCS) is developed as a tool to compare the concentration of economic output across different urban areas. Because of the construction of the index, this tool can be used to compare cities in different countries and at different levels of development.

African cities are often looked at as a bloc, with the focus being on their collective failings relative to other global cities or cities in the developing world. A shortfall of this approach is that it ignores some of the externalities that African cities face relative to those in other parts of the world. As a result, the idiosyncrasies among cities in Africa can be overlooked. The SCS aims to correct this. It is important to stress that this measurement is by no means a comprehensive evaluation of cities. It evaluates cities solely on output relative to population size and does not consider other measures of welfare or distributional dynamics.

The SCS has several uses:

- Nationally, policymakers acting under budget constraints can use the SCS to determine where place-based policies give the greatest returns.
- Private firms can utilise the SCS to help make locational choices, while investors can use it to help make decisions regarding capital allocation.
- Local policymakers are also able to utilise the SCS as among the factors that contribute to (or detract from) economic concentration.

The findings show that some cities in Africa overperform. That is, they produce significantly more economic output than would be expected relative to their population. This phenomenon is not unique to a country, or region in Africa, but is scattered throughout the continent. And although there is a positive correlation between economic concentration and population size – suggesting the presence of economies of scale – population alone does not determine the relative position of an African city when ranked using the SCS. This is consistent with what has been observed elsewhere, though there does appear to be a slightly higher concentration of African cities closer to the bottom of the sample.

Why is such a distribution of economic activity observed? Although the report does not examine this in depth, there does appear to be a link to access to finance and technology, better regulatory procedures, the ability to job match, and engagement in international trade. Connectivity, including a city's density, quality of physical infrastructure, and access to social networks also appear to be important factors driving the concentration of economic activity across different metropolitan areas. However, this report is not a comprehensive overview of all African cities, and there remains a great deal of scope for further research in this area.

Economic activity is concentrated in a minority of African cities and is expected to remain so for at least the next decade. It is important for both the private and public sector to recognise this, so investments can be made that unlock the vast potential of what will become the second largest urban population of any continent.

1 Introduction

Traditionally, superstars have been those musicians, athletes and entertainers that are among the best in their field and capture an outsized share of public attention. More recently, economists have begun to apply the term 'superstar' to markets. The genesis of this was Sherwin Rosen's seminal study[1] detailing a 'concentration of output among a few individuals, marked skewness in the associated distributions of income and very large rewards at the top' for some economic activities. Put simply, some markets are dominated by a small number of individuals that capture an outsized share of returns. Similar effects have been observed in firms[2] and sectors[3].

In his 2011 book Triumph of the City, Harvard urban economist Edward Glaeser calls cities 'our species' greatest invention'[4]. As technology continues its relentless march forward, the importance of cities as engines of progress continues to be enhanced. As Glaeser notes, 'the central paradox of the modern metropolis – proximity – has become ever more valuable as the cost of connecting across long distances has fallen'[5].

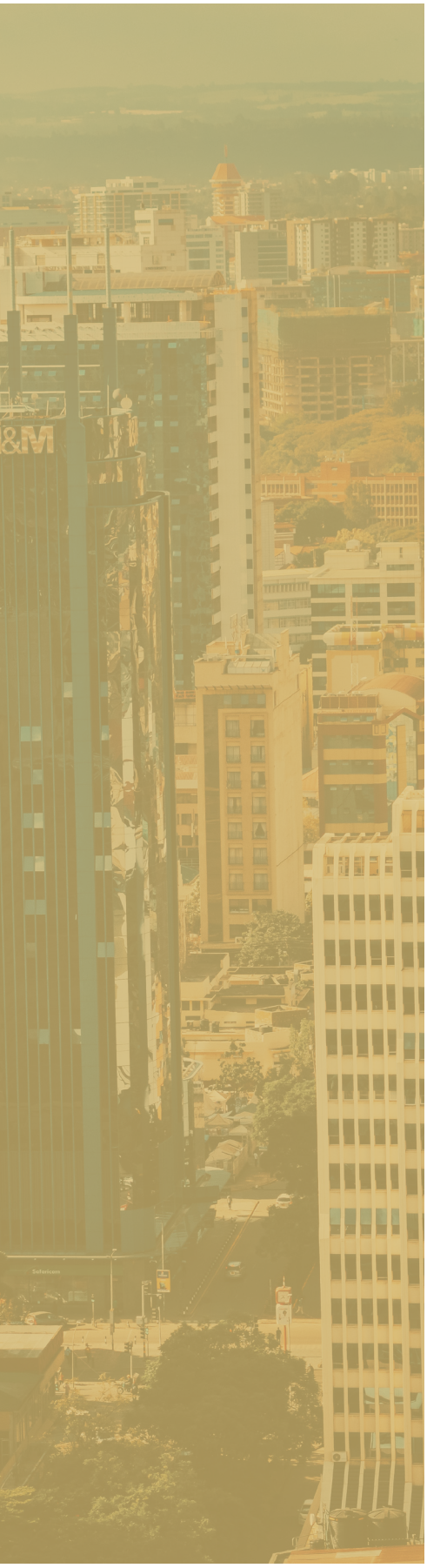
The data appears to support this: in a 2018 report, the McKinsey Global Institute (MGI) found that 50 cities, which make up just 8% of the world's population, account for more than a fifth of the world's output[6].

Perhaps unsurprisingly, these cities also appear to be among the most integrated and innovative, and are home to the headquarters of nearly half of the world's largest firms.

This dynamic is unlikely to change over the long term. The COVID-19 pandemic has dramatically impacted the way we interact and may in fact further elevate the importance of cities. For example, many governments have used investment in physical infrastructure to stimulate economic activity. The increased population densities offered by cities lower the costs of these place-based fixed investments by supplying a larger pool of skilled labour. They furthermore improve access to materials through more robust supply chains and increase the return from these investments by spreading benefits across a larger portion of the population.

The geographic concentration of certain economic activities is certainly not a new phenomenon. Clusters, where groups of horizontally or vertically integrated businesses locate close to each other to take advantage of agglomeration economies, have long been studied by economic geographers.

1 See Rosen (1981)
2 An example is the dominance of FAANG – Facebook, Apple, Amazon, Netflix and Google – in the technology sector. For more detail see Autor et al. (2020).
3 This is particularly relevant for sectors which utilise relatively little labour and a lot of intangible capital as factors of production. For a more detailed discussion see Megna and Mueller (1991), McGrattan and Prescott (2010), Marrocu et al. (2012).
4 See Glaeser et al. (2011).
5 Ibid.
6 See Manyika et al. (2018).



Nobel Laureate Paul Krugman highlighted the persistence of manufacturing activities in the north-eastern United States, despite southern states offering competitive advantages such as lower labour costs and taxes[7].

Krugman noted that this is evidence of specific locational features exhibiting increasing returns to scale: because of features specific to certain geographies, firms that locate there are more productive than they would be had they located elsewhere. Firms are incentivised to locate in these geographies to take advantage of these increasing returns. Because more productive firms are able to offer greater compensation to their employees, there is also incentive for individuals to settle in these locations, especially if an individual's skillset is particularly relevant to an industry grouping that clusters in a specific locale.

Barring a seismic change, this sort of geographic advantage is difficult to offset. Even so, some cities prove resilient to even the largest shocks. New York City was able to reinvent itself as a services powerhouse after the winds of globalisation shifted the city's traditional strength in textile manufacturing overseas. And although this transformation took place over several decades, other cities such as Detroit have been unable to reinvent themselves with the same level of success.

7 See Krugman (1988).

2 Cities as superstars

How much credit can we give to cities for localised economic successes and failures? This can be a difficult question to answer, given that the focus of economic analysis has traditionally been the nation state. Moreover, cities can be significantly impacted by factors outside of their control, such as national economic policies and the efficacy of institutions. Place-based investments, wealth transfers, and trade policy are a few examples of policies normally enacted at the national level that can have a significantly different effect on regions and cities[11]. These are evident between cities in the same countries and are amplified when looking at cities across international borders, particularly at different levels of development[12].

One of the defining features of the 2018 MGI analysis is that the 'superstar cities' are generally either from developed countries or China. Any others tend to be in those larger emerging markets with one central, dominant city (Mexico City, Jakarta, Doha, etc.). Of the 50, only one (Cairo) is in North Africa, and none are in Sub-Saharan Africa. Are these cities superstars in their own right, or are they just benefiting from positive externalities? Would Luanda make this list if it benefited from the same legal system as Los Angeles? How would Pretoria perform if it could access the same trade agreements as Paris? Would Blantyre be considered a superstar if it had the same level of national investment as Beijing or Buenos Aires, or could access the same economies of scale as cities with larger populations[13]?

11 Government investments in physical infrastructure are an example of a place-based policy. See Parilla and Bouchet (2018).

12 See Jedwab et al. (2021).

13 Population can be important if there are returns to scale in city size, see Segal (1974). There is also a large body of research describing the relationship between city size and agglomeration economies, which is generally seen as being a virtuous circle.

3 The RICS Superstar City Statistic

How can a city be evaluated, with appropriate consideration given to how its infrastructure, local policies and stock of human and managerial capital aids or detracts from the creation of agglomeration economies? Though this is a difficult question to answer precisely, it is nonetheless important. Cities will remain the centres of global economic growth and innovation in an increasingly urbanised world. To estimate this, we have modified the MGI methodology to better estimate the local factors that facilitate a city's success. The result is the RICS Superstar City Statistic (SCS).

$$SCS = \frac{\text{city GDP / national GDP}}{\text{city population / national population}}$$

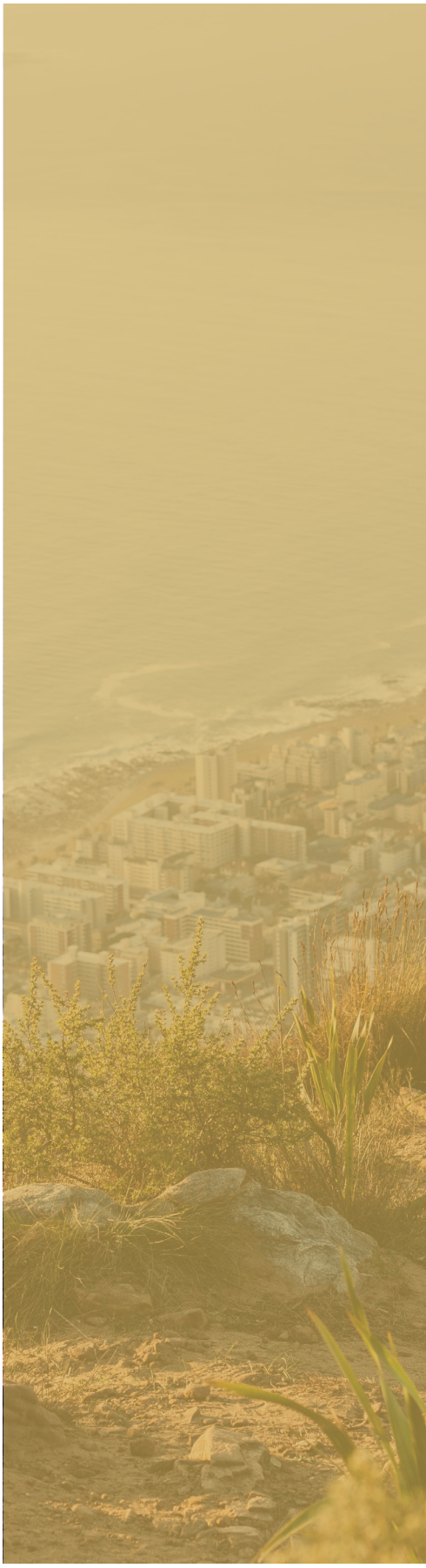
A more detailed overview of the SCS, including a more mathematical exposition, can be found in Appendix A, but simply put, it measures the share of a city's national output relative to its share of the national population. When the SCS is equal to one, the city's production is in line with the national average. When the SCS is greater than one, the city has oversized productivity, and vice versa when the SCS is less than one.

3.1 Relevance of the SCS

The SCS has beneficial characteristics for benchmarking city performance. It controls for a 'dominant city effect', where cities contribute a large amount of GDP but also comprise a large share of the national population. Similarly, it also enables a better comparison between cities of different sizes, as small, highly productive cities will score better than their larger, less productive counterparts.

Perhaps most importantly, the SCS allows for better comparisons across international borders because it compares economic concentration within countries. That is, cities that are exposed to similar national economic policies, have access to the same workforce[15] and operate under the same legal systems. Thus, differences between cities must be attributable to local factors. This is particularly important when evaluating cities in less developed regions, in particular Africa. By definition, per capita GDP is lower in developing than developed countries, and adjusting for price differences[16] does not account for idiosyncratic factors across several countries. To note just one example, as a result of weaker political institutions, dominant cities tend to develop in lower-income countries[17], which distorts the relative economic performance of these cities under normal international comparisons.

At the most basic level, the SCS can be used to assess a city's performance relative to others within a country, to see where output per capita is above or below the average. This can, in turn, be utilised by investors and policymakers both at national and local levels. The private sector can use this to help make investment decisions, while the public sector can learn from higher performing cities and apply these lessons to those that appear to be performing less well. Furthermore, it can be used to help make decisions about the allocation of funds for place-based fixed investments by helping to identify which areas possess the efficiencies to increase returns from such place-based fixed investments. This is particularly true given the longer-term nature of this type of investment (e.g., physical infrastructure) and the tendency for the concentration of economic activity to increase over time.



15 This assumes that labour is perfectly mobile within countries.
16 Adjusting for purchasing power parity (PPP) does not fully compensate for differences across countries, as PPP only adjusts for input prices. It does not isolate for other factors such as the differences in legal systems etc. across countries discussed in Appendix A.
17 See Ades and Glaeser (1995).

3.2 Limitations

The SCS is only one metric with which to evaluate a city's success and it carries a number of limitations. What it describes is the concentration, or lack thereof, of economic activity in a particular city relative to other cities in that country. The SCS should not be considered in isolation – other metrics, such as liveability, sustainability and the opportunities afforded to residents should also be considered when determining how 'successful' a city is. It is important to keep in mind when interpreting the SCS that it neither measures the distribution of output across a city's population, nor does it take into consideration other measures of welfare. There remains significant scope for more study of any potential causal linkages between the SCS and other measures of city residents' welfare, as well as to what degree the legacy of colonialism has contributed to a city's ability to over perform.

This report examines some potential drivers of economic concentration at a high level, but there remains a lot of scope for further research into these areas.

The methodology used in this paper isolates differences in the concentration of physical, human and managerial capital between cities in the same country but cannot specify differences beyond this point. More work also needs to be done to identify the forces driving these differences.

Evaluating cities rather than countries can also introduce data issues, given that the quality of data available for cities varies and there can be issues with data availability in less developed countries. A full discussion on the data used in this report can be found in Appendix C.

4 Africa's superstar cities

One of the striking features of the 2018 MGI analysis was the absence of any cities from Sub-Saharan Africa. This could be a result of factors that are largely outside of the control of cities themselves – a lack of political and economic institutions as well as a less urbanised population all work against African cities in international comparisons. This can distort how African cities are viewed, as they generally face more negative externalities than cities elsewhere in the developed, or even developing, world.

A World Bank study of African cities found that they were crowded, fragmented and expensive relative to cities in other developing regions[19]. The lack of connectivity posed a particular challenge as cities were unable to take advantage of any potential agglomeration economies from population densities. More land, in particular land close to the city centre, is left underutilised or vacant compared with similar sized cities in developing Asia and Latin America[20]. The provision of public services, such as infrastructure, is more expensive with the added sprawl, and people are often unable to access employment opportunities, which increases skill and educational mismatch in the labour force[21]. This type of environment is expensive for both companies and consumers, as these cities generally lack amenities that would normally be found in cities of similar size.

There is little debate that, at an aggregate level, African cities are trailing behind cities in other developing regions. However, between these regions, and especially between countries across these regions, there are several idiosyncratic characteristics that are beyond the control of cities. Each city has a unique identity and form, and it is difficult to compare groups in aggregate, especially across different regions. Thus, comparing African cities to each other may be more apt.

A sample from the MGI Cityscope 4.0 database[22] of 124 African cities from 33 African countries is used to attempt to objectively answer how similar cities in Africa are. Of those cities, 28 are from 4 countries in North Africa, while the remaining 96 cities are from 29 countries in Sub-Saharan Africa. The sample includes 29 Nigerian cities, 13 Egyptian cities and 9 cities from each of South Africa and Morocco. The other 29 countries have 5 or fewer cities included in the sample.

The size of cities included in the sample varies:

- 40 cities are 'small' cities with populations between 200,000–500,000
- 40 are 'medium' cities with populations between 500,000–1,000,000 and
- 40 are 'large' cities with populations between 1,000,000–10,000,000.

The remaining cities are the 4 'extra-large' African cities with populations greater than 10,000,000 (Cairo, Johannesburg, Kinshasa, and Lagos). Full details of the dataset, including how the sample was drawn and a full list of the countries included, can be found in Appendix C.

19 See Lall et al. (2018).
20 See Henderson and Nigmatulina (2016).
21 See Morsy and Mukasa (2020).
22 McKinsey Global Institute (2020).

As can be seen in Figure 4.1[23], there is a high degree of variance in rates of urbanisation across African countries. This ranges from a high of 68% of the population in South Africa to just 9% of the population in Burundi, Chad, Niger, and Rwanda. It is evident that the rate of urbanisation between countries varies considerably. There are also large differences in the urban contribution to GDP, suggesting that productivity gaps between urban and rural areas vary substantially across the continent. Examination of this gap may be of interest. However, to include a city's contribution to a country's total GDP in this paper's analysis would skew the results. This study, therefore, only uses urban population and GDP data (rather than total population and GDP).

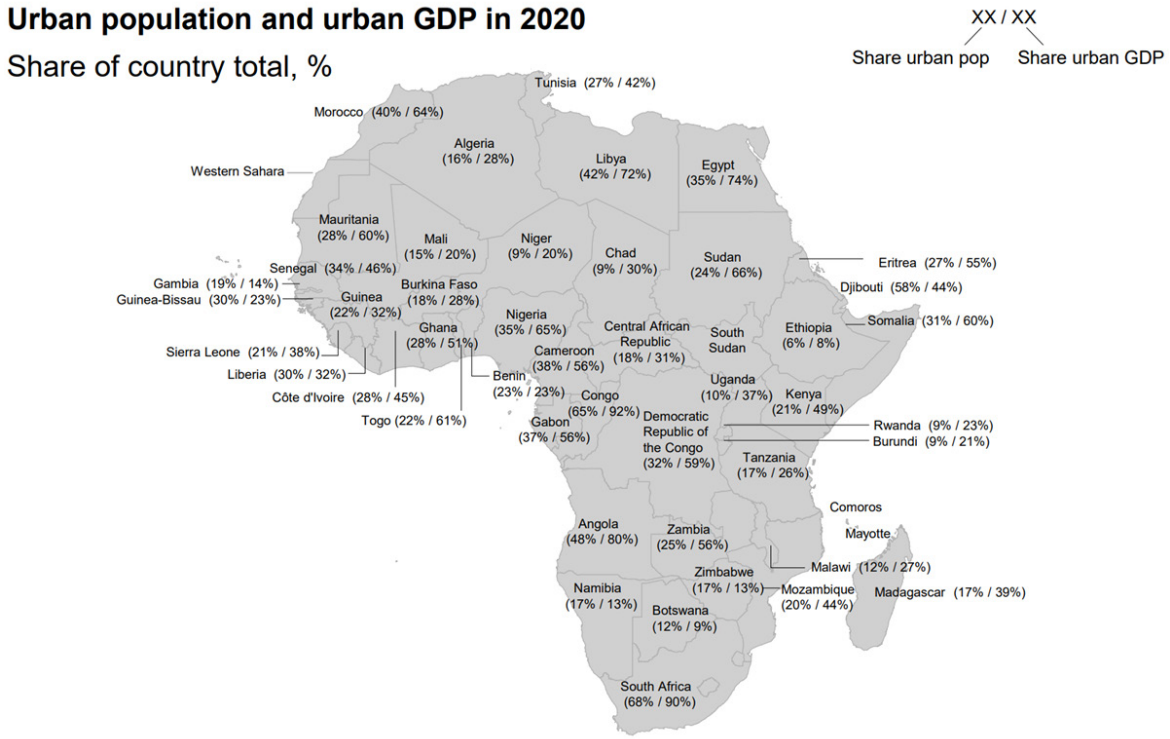


Figure 4.1 Africa's share of urban population and urban GDP

Source: MGI Cityscope 4.0 database; McKinsey Global Institute analysis

4.1 Applying the Superstar City Statistic

The SCS is applied to this dataset, dividing a city's share of its respective national urban GDP by the city's share of its national urban population. The results, with cities ranked from largest SCS to smallest SCS can be viewed in Figure 4.2.

The first obvious characteristic of Figure 4.2 is the clearly increasing slope towards the top of the distribution, indicative of a high degree of economic concentration among a small number of cities. It is also clear that this effect diminishes at a rapid rate. Figure 4.3 shows that even within the top decile of cities as ordered by the SCS, there is a significant difference

23 Note that in Figure 4.1 urbanisation rates are the share of the national population residing in cities with populations over 200,000, so they may differ slightly from urbanisation rates tracked by other organisations that have set a lower bar for the level of population an area needs to achieve to be labelled urban.

in the economic concentration among cities. There is a high degree of concentration at the very top of the sample: an interpretation of these results is that residents of Oran, Port Harcourt and Pretoria produce more than twice as much economic output as the average urban dweller in Algeria, Nigeria and South Africa respectively.

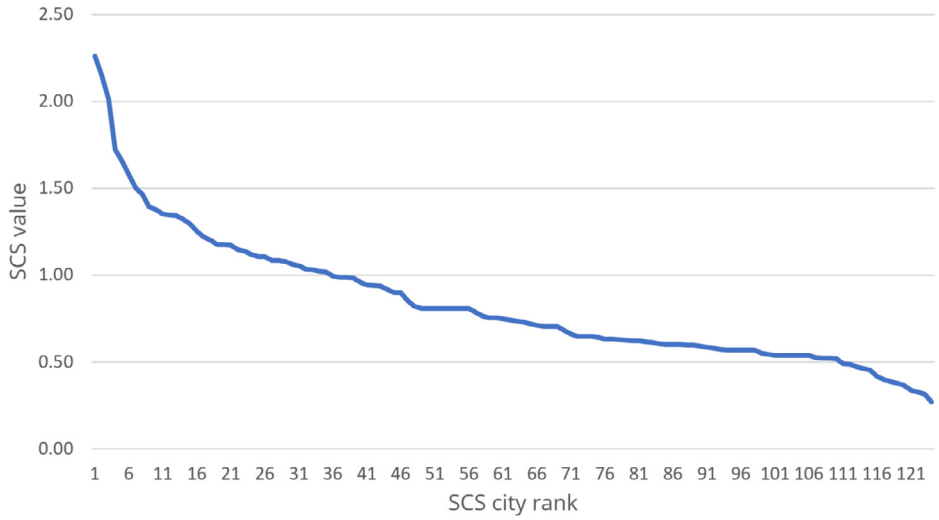


Figure 4.2 Superstar statistic for African cities

Rank	City	Country	SCS	Percentile
1	Oran	Algeria	2.26	100
2	Port Harcourt	Nigeria	2.15	99
3	Pretoria	South Africa	2.01	98
4	Aba	Nigeria	1.72	98
5	Nairobi	Kenya	1.65	97
6	Mwanza	Tanzania	1.58	96
7	Hargeisa	Somalia	1.5	95
8	Casablanca	Morocco	1.46	94
9	Luanda	Angola	1.39	94
10	Tripoli	Libya	1.38	93
11	Maputo	Mozambique	1.35	92
12	Khartoum	Sudan	1.35	91
13	Blantyre	Malawi	1.34	90
14	Kinshasa	Democratic Republic of the Congo	1.32	90

Figure 4.3 Top decile of African cities

Full details of city rankings can be found in Appendix D. Apart from Nigeria, which represents roughly a quarter of the sample of cities, no country has multiple cities in the top decile.

There is a higher share of larger cities in the sample, which appears, at least to some degree, to support the relationship between economic productivity and city size hypothesised in the literature[24].

The top decile is not exclusively the domain of large cities, however. Medium-sized cities Oran, Mwanza, Hargeisa and Blantyre also make the top 14. Only one of the largest four cities makes the top decile (Kinshasa), but the remaining three are in the top quartile: Cairo ranked 20th (85th percentile), Johannesburg 30th (77th percentile) and Lagos 31st (76th percentile).

The relationship between city size and economic concentration is made clearer in Figure 4.4, which shows that roughly a quarter of large cities fall within the top decile and a quarter of small cities fall within the bottom decile, indicative of economic returns to scale from city size. However, size does not guarantee returns to scale, as a quarter of large cities can also be found in the bottom half of the distribution (deciles 6 through 10).

	Decile (2020)									
City size	1	2	3	4	5	6	7	8	9	10
Large	23%	18%	18%	8%	10%	8%	8%	0%	10%	0%
Medium	10%	8%	8%	15%	10%	10%	5%	18%	13%	5%
Small	0%	0%	3%	8%	13%	13%	18%	15%	8%	25%

Figure 4.4 Share of African cities by decile

24 See Segal (1974).

Figure 4.5 shows this in more detail. The vertical axis of the chart is a city's percentile ranking in the sample for the SCS (Oran=100, Port Harcourt=99, Pretoria=98, etc.). The horizontal axis is the city's corresponding percentile ranking in terms of population size for the cities in the sample (Cairo=100, Lagos=99, Johannesburg=98, etc.). Although there is clearly a positive relationship between a city's population and economic concentration, it is by no means deterministic, with a city's size alone only explaining roughly 30% of its economic concentration[25].

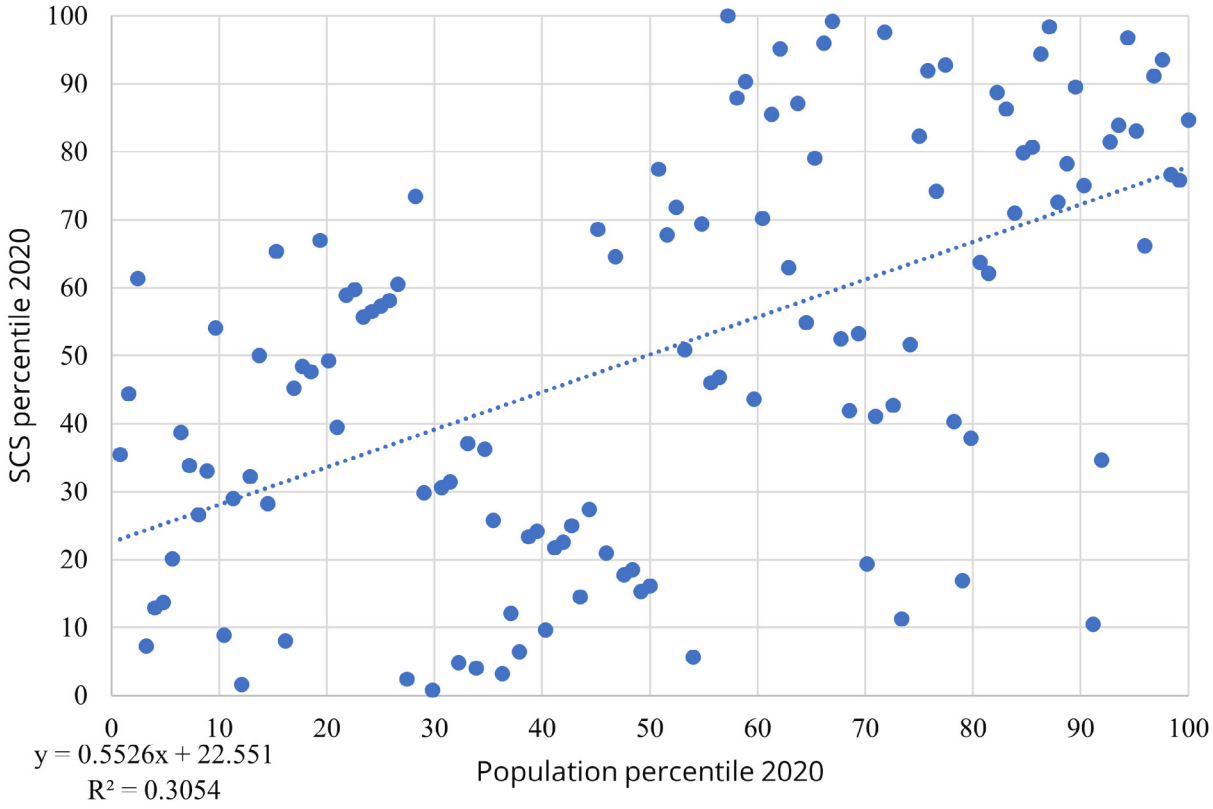


Figure 4.5 Percentile ranking of SCS vs population

4.2 Examining the relationship between population size and economic output

Although there are no small cities in the top decile, there are several medium-sized cities – including Oran, the top ranked city by the SCS. The other medium-sized cities in the top decile of the SCS are Mwanza, Haregeisa and Blantyre. Agadir, Sekondi-Takorandi and Bobo-Dioulasso are medium-sized cities that sit just outside the top decile. There are also several 'smaller' large cities in the top decile of the SCS: those cities with populations of only slightly more than one million. These include Port Harcourt, Aba, Maputo and Kigali.

25 As is shown in Appendix B, this is a higher share than in the United States where city size only explains 11% of its relative economic concentration. There could be several reasons for this, one being the number of cities included in each analysis. For the US, the entire population of 384 cities is examined, whereas only a sample of 124 African cities are looked at.

However, it is important to note that the output of cities heavily leveraged to natural resource production, such as Port Harcourt, may fluctuate dramatically over time.

The increased importance of these smaller cities in driving economic output is in line with broader trends across global economies: that of labour increasingly being substituted for capital. Take the example of General Motors (GM), which in the 1950s was one of the world's most valuable companies. At the time, GM employed a share of the US workforce that would be equivalent to roughly 1.5 million people today. Moving forward to the present day, Apple is one of the world's most valuable companies, but only employs 90,000 people. As knowledge-intensive industries gain a larger share of economic output and labour intensity generally drops across all industries, the chances for smaller cities to become economic centres of gravity increases. This is a reality African cities are facing now, and will continue to face as they develop.

However, there is still an observed positive relationship between population and economic concentration. It does appear as though there is some critical mass to achieving returns to scale for African cities, as there are no small cities in the top two deciles. Intuitively there is some sense to this: higher populations generally offer greater returns to place-based investments (such as infrastructure) and can support a higher level of amenities. The complete absence of small cities in the top decile does differ from developed markets such as the United States (see Appendix B), where small, highly specialised (usually in natural resources) cities can produce a significant amount of output relative to their population size.

There are a few reasons why this may not occur in Africa:

- The infrastructure in smaller resource-based cities is not developed enough to take advantage of returns to scale.
- The overall scarcity of capital (or, more generally, employment opportunities) in less developed countries means that areas that specialise in natural resource production, such as Port Harcourt, may utilise more labour in production (or are expected to have more employment opportunities), which would naturally result in more populous cities, *ceteris paribus*.
- The prices of natural resources in which African cities specialise, which are determined internationally, are low enough relative to the costs of production (which is generally higher in African cities than elsewhere) so that the economic gains from natural resource endowment are minimal. This could also be a result of the timing of when the sample data was drawn relative to the business cycle.

The second notable characteristic of Figure 4.2 is that there is an increase of the slope towards the tail of the sample. This indicates that there are a large number of cities that produce little relative to their population size.

The bottom decile of cities is shown in Figure 4.6. As an example, it shows that the average individual in Ndola produces roughly a third of the economic output of the average urban dweller in Zambia.

Rank	City	Country	SCS	Percentile
112	Onitsha	Nigeria	0.49	10
113	Asyut	Egypt	0.47	10
114	Toliara	Madagascar	0.46	9
115	Fianarantsoa	Madagascar	0.45	8
116	Bouake	Ivory Coast	0.41	7
117	Berbera	Somalia	0.4	6
118	Misrata	Libya	0.39	6
119	Kismayo	Somalia	0.38	5
120	Port Sudan	Sudan	0.36	4
121	Zinder	Niger	0.34	3
122	Ndola	Zambia	0.33	2
123	Kasangati	Uganda	0.31	2
124	Kira Town	Uganda	0.27	1

Figure 4.6 Bottom decile of African cities

Figure 4.7 also illustrates both of these features, showing the mean (left axis) and standard deviation (right axis) for the SCS for each decile. By design, the deciles are decreasing in the mean. However the decline in the mean from the first to second decile is significantly larger than what is observed when moving through subsequent deciles. The standard deviation is also substantially higher, showing significantly more variation around the top of the sample in comparison to what is observed elsewhere.

The standard deviations stabilise in deciles two through nine, suggesting a large share of cities are around 'average'. The standard deviation increases for the 10th decile, indicating that the cities at the bottom of the distribution have substantially less economic power, even than those in deciles directly adjacent to them.

Such a distribution of economic concentration among cities is not unusual. Indeed, a similar dynamic is observed in developed markets such as the United States[26].

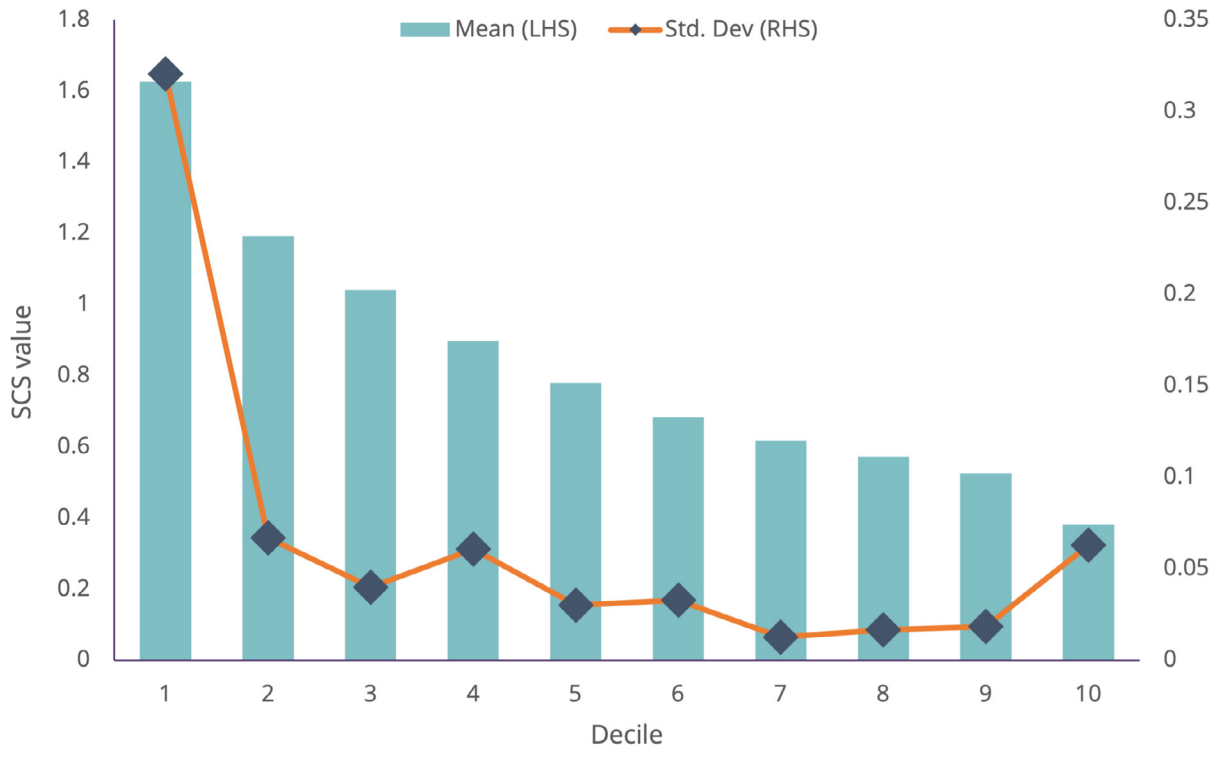


Figure 4.7 Average SCS and standard deviation for each decile of African cities

26 See Appendix B for a study of 384 metropolitan areas in the United States. Although there appears to be a more acute economic concentration at the 'top' of the data, this may be a result of a 'hollowing-out' of the African sample (see Appendix C for more details).

However, there are some key differences, the main being that there is significantly more skew to the small end of the distribution of the sample. This suggests a much higher concentration of low-productivity cities in Africa relative to more developed regions (such as the United States).

There is some evidence of this in Figure 4.8, which shows the highest and lowest ranked cities in countries that have multiple cities included in the sample.

For comparison, Figure 4.8 also includes the highest and lowest ranked cities in the United States, ranked as if they were a part of the African sample[27]. The degree of variance between the highest and lowest ranked cities within countries is evident, especially in Egypt, Morocco, Nigeria, and South Africa, which all have at least nine cities included in the sample.

	Highest ranked			Lowest ranked		
Country	City	SCS	Rank	City	SCS	Rank
Algeria	Oran	2.26	1	Blida	0.57	93
Angola	Luanda	1.39	9	Saurimo	0.53	107
Cameroon	Yaoundé	1.12	24	Maroua	0.55	99
Ivory Coast	Abidjan	1.14	23	Gagnoa	0.68	44
DRC	Kinshasa	1.32	14	Kikwit	0.54	100
Egypt	Cairo	1.18	20	Asyut	0.47	113
Ethiopia	Addis Ababa	1.08	28	Dire Dawa	0.9	45
Ghana	Sekondi-Takoradi	1.22	17	Accra	1.03	32
Guinea	Manéah	0.6	85	Nzerekore	0.52	110
Libya	Tripoli	1.38	10	Misratah	0.39	118
Madagascar	Antananarivo	1.2	18	Fianarantsoa	0.45	115
Malawi	Blantyre	1.34	13	Lilongwe	0.82	48
Morocco	Casablanca	1.46	8	Salé	0.49	111
Mozambique	Maputo	1.35	11	Tete	0.52	109
Nigeria	Port Harcourt	2.15	2	Onitsha	0.49	112
Somalia	Hargeisa	1.5	7	Kismayo	0.38	119
South Africa	Pretoria	2.01	3	Pietermaritzburg	0.64	75
Sudan	Khartoum	1.35	12	Port Sudan	0.36	120
Tanzania	Mwanza	1.58	6	Dar es Salaam	1.15	22
Uganda	Kampala	1.3	15	Kira Town	0.27	124
US	San Jose	2.73	1	Brownsville	0.4	117

Figure 4.8 Highest and lowest ranked cities by the SCS

27 For consistency, cities in the United States with populations less than 200,000 were not included, though more information on this can be found in Appendix B.

4.3 Fostering agglomeration economies in African cities

But what are the factors that are driving the differences in economic concentration? What is enabling some cities to perform above their economic weight, while others remain much less productive relative to the size of their population? The World Bank found that a key barrier for African cities was that they were crowded rather than dense.

That is, cities do not take advantage of vertical space and do not have the connectivity required to take advantage of potential agglomeration economies from higher population densities. At a glance, it does not appear that there is a particularly strong relationship between population density and economic concentration in Africa, where data is available[28]. Indeed, Figure 4.9a shows almost no relationship between a city's percentile rank of economic concentration and percentile rank of population density.

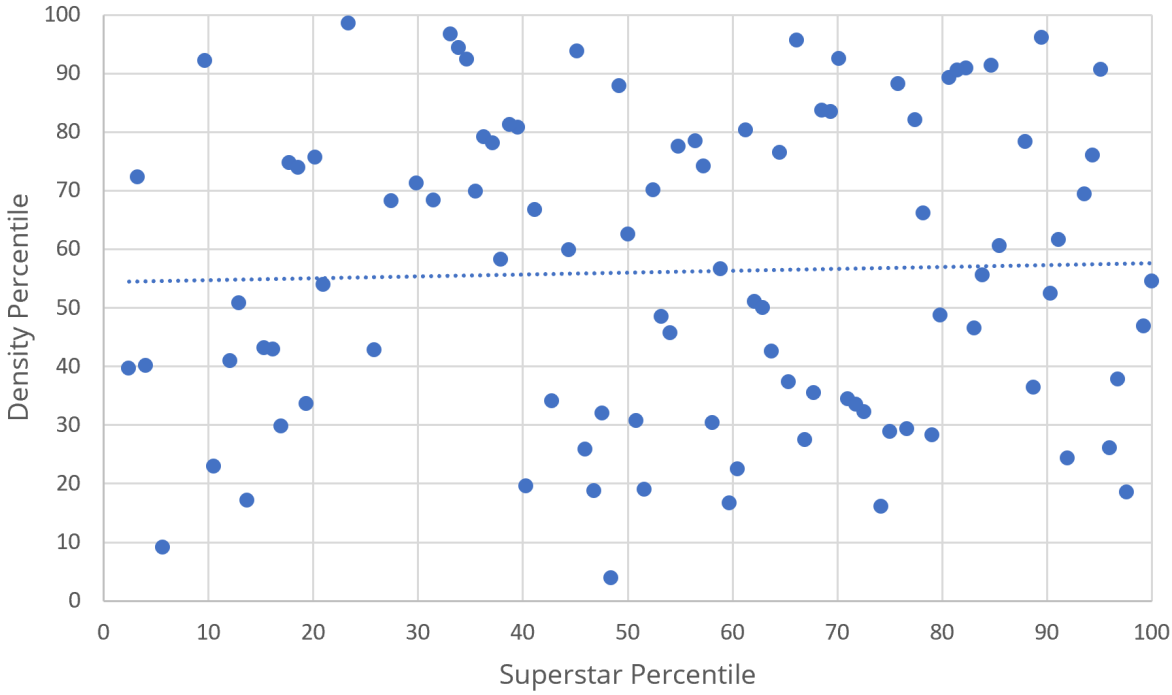


Figure 4.9a Relationship between economic concentration and population density

28 OECD (2015). Data from 2015 was available for 98 of the 124 cities included in the sample.

Even when isolating for the largest cities included in the sample (Figure 4.9b), the relationship is only modestly positive (and not particularly convincing). This may be evidence of the World Bank's findings of an overall lack of density among all African cities. That is, at low levels, marginal differences in population densities may not significantly impact economic concentration.

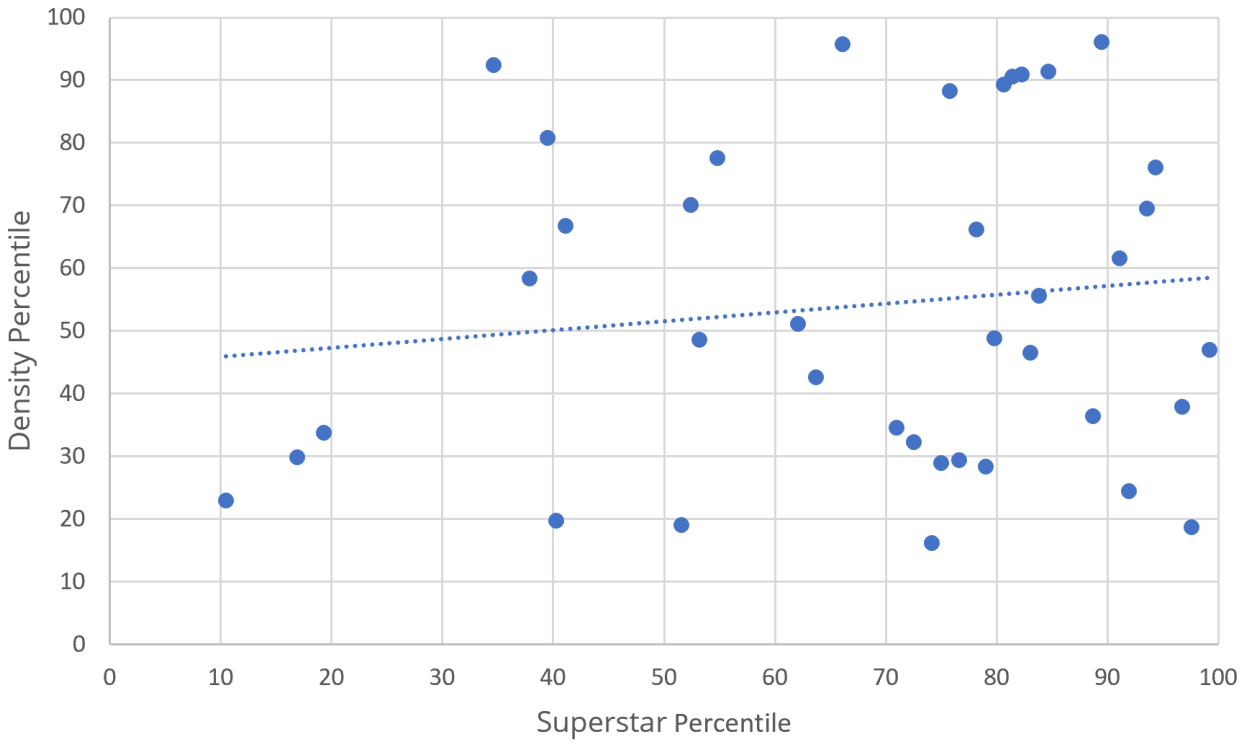


Figure 4.9b Relationship between economic concentration and population density for large and extra-large cities

Source: OECD (2015)

For cities to be able to take advantage of returns to scale, people and businesses must be able to connect. Indeed, one of the biggest inhibitors of African cities is that they have tended to grow in an unplanned manner, leading to fragmentation and a high degree of skill mismatch between employers and employees[29]. Nairobi is an example of this, as even jobs in and around the central business district (CBD) are difficult to access by the most popular form of public transport[30].

Although a lack of connectivity is generally an issue for African cities, some do perform better than others. Namely, firms near the top of the distribution of the SCS tend to have much better access to infrastructure than their counterparts in the same country. World Bank data shows that this applies not only to transportation, but access to electricity and sanitation as well. As infrastructure tends to be a public good, this suggests that the CBDs in these cities have a higher concentration of amenities than their national peers, which would also positively affect the wellbeing of residents in these areas.

29 See Morsy and Mukasa (2020).
30 See Avner and Lall (2016).

A key aspect of harnessing agglomeration economies is enabling businesses to maximise returns to scale. Using data from World Bank surveys, cities with an SCS in the top decile of the sample have more access to finance and technology, better regulatory procedures, and the ability to job match and engage more in international trade than the national average. The ability to engage in overseas trade is a crucial differentiator for African cities, as it will better incentivise efficiencies and reduce operating costs for firms, enabling them to take advantage of increasing returns to scale.

One of the often overlooked but nonetheless important aspects of a city's success is social cohesion. The importance of social capital – that is, connections between individuals to form social networks – has long been recognised[31] but is perhaps even more important in the developing world as informal social networks often fill in for a lack of formal services, from insurance to health and childcare, and even assisting with job searching. Integration can be used as a proxy for social cohesion. In the United States, higher levels of integration have been tied to increased socio-economic mobility[32], and also appear to be positively correlated with economic concentration in cities[33]. Data on social integration is more difficult to source in Africa, though the Department of Statistics South Africa has mapped and ranked racial integration among its cities. Although more work needs to be done to determine the precise impacts of social integration on economic performance, there does appear to be some correlation between the concentration of economic output and integration. For example, Pretoria ranks higher than Durban for integration, and according to the SCS, the average person in Pretoria produces roughly twice the level of economic output as the average resident of Durban.

It must be noted that the characteristics highlighted in this discussion only show a correlation, not a causal effect. There remains a huge scope for more research specifying the causal drivers of economic concentration in cities and regions both in Africa and globally.

31 See Putnam (2000).

32 See Chetty et al. (2014).

33 See Appendix B.

5 The outlook for Africa's cities

Africa's future is inexorably linked to its cities, both in terms of economic performance and social wellbeing. According to projections made by the United Nations[34], by 2030 Africa's urban population will rise to over 800 million, trailing only Asia in the league table of urbanised continents. It is essential that African cities position themselves to take advantage of this massive urban dividend.

So how are Africa's cities expected to perform over the next 10 years? According to MGI forecasts[35], the concentration of economic activity at the tails of the distribution are not expected to change significantly. Figure 5.1 shows that those cities in the top decile of the 2020 distribution have a 69% chance of remaining there in 2030 (and a 92% chance of being in the top 2 deciles). If a city was in the second decile, there is a 67% chance that it will be in the second decile in 2030. Similarly, if a city was in the bottom decile of the distribution there is a 58% chance it will still be there in 2030. Figure 5.1 also shows the shift in expected rank for the top and bottom deciles in 2030. Simply put, most cities will not move at all. The handful of small cities expected to enjoy rapid growth over the next decade constitute exceptions to this rule.

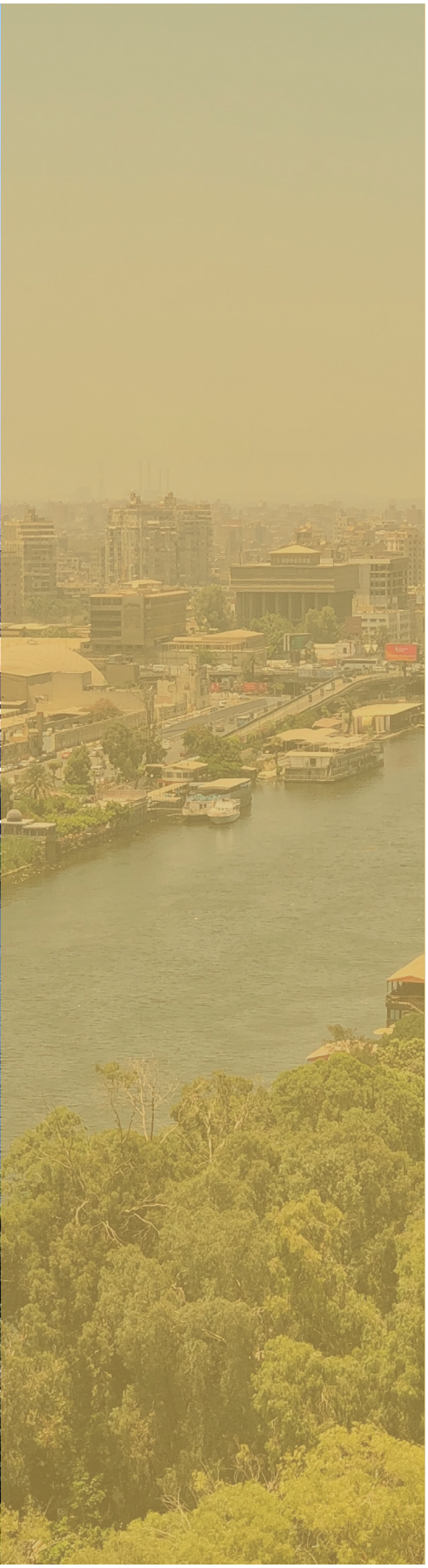
		2030 Decile									
		1	2	3	4	5	6	7	8	9	10
2020 Decile	1	69%	23%	0%	0%	0%	8%	0%	0%	0%	0%
	2	8%	67%	17%	0%	8%	0%	0%	0%	0%	0%
	3	0%	0%	38%	54%	0%	0%	8%	0%	0%	0%
	4	25%	0%	8%	17%	25%	8%	0%	0%	8%	8%
	5	0%	0%	0%	0%	15%	69%	15%	0%	0%	0%
	6	0%	8%	8%	17%	8%	0%	33%	25%	0%	0%
	7	0%	0%	17%	8%	17%	0%	17%	33%	8%	0%
	8	0%	0%	8%	0%	8%	0%	0%	46%	31%	8%
	9	0%	0%	0%	0%	25%	8%	0%	0%	42%	25%
	10	0%	0%	8%	0%	0%	0%	25%	0%	8%	58%

Figure 5.1 Expected decile rank in 2030 based on decile rank in 2020

Source: MGI Cityscope 4.0 database; McKinsey Global Institute analysis

This is not unusual and is in line with what has been observed internationally over the past two decades[36]. Once a city is in the top or bottom of the distribution, it is very likely to remain there in the medium term (barring some sort of large exogenous shock).

34 UN (2018).
35 McKinsey Global Institute (2020). Forecasts were made prior to the COVID-19 outbreak.
36 See Appendix B.



There is a simple logic behind this. When a city enters the top of the distribution, it maximises agglomeration economies and displays increasing returns to scale. This, in turn, incentivises firms to locate there, which attracts more talent from other cities. This positive feedback loop tends to widen the gap between the top decile of the distribution and their peers.

On the other end of the spectrum, strong diseconomies of scale exhibited by cities at the bottom of the distribution incentivise individuals and firms to relocate away from these cities, causing a negative feedback loop. In an ideal world, proper investments could be made and policies deployed to lift up those cities at the bottom of the distribution and continue to support the expansion of cities at the top of the distribution. However, this is not the world we live in. Policymakers must operate within budget constraints and contend with variables outside of their control. Thus, the question emerges, should they focus on efficiency or equity?

Economics is not typically well-suited to answer this question. However, the data can offer some insights. African cities have an urgent need for physical infrastructure. Evidence has shown that the returns for such place-based policies may be independent of where they are directed. That is to say that if a national government were to make an investment in city A or city B, it would not matter in aggregate over the long run; the country-level return to the investment would be equal. But this changes under increasing returns. If a city exhibits increasing returns to scale, the return on a place-based investment will be greater than if the capital was allocated elsewhere. Given this, national policymakers have an incentive to increase the concentration of economic output in some cities, at least in the near term. This is particularly pertinent to African cities given their generally lower level of development and tighter budgets than cities in other regions. If investments were to focus on select superstar cities, the additional amenities and employment opportunities could attract individuals both from rural and other urban areas. This population growth would reduce the per capita cost of any physical investments, making them much more efficient.

But this cannot be done in a vacuum. Perhaps more important than physical infrastructure is institutional development, in particular land reforms. African cities rank relatively poorly in terms of having clearly defined rules and regulations surrounding the usage of land. Not only does this increase valuation complexities, but it also reduces incentives to invest and is perhaps an important reason

why African cities are so fragmented. If this fragmentation is not altered, the additional population growth will only result in more 'leapfrog' settlements, fragmented cities and diseconomies of scale.

Rwanda is a poster child for successful land reform in Africa. Between 2004 and 2013 the government successfully documented all 10.86 million parcels of land in the country. This required both the creation of a new system of land rights and the adoption of appropriate technology to make continued documentation effective. Now, the Global Infrastructure Hub ranks Rwanda equal to high-income countries in infrastructure procurement, and the government's ability to plan, coordinate and select infrastructure projects ranks above high-income countries. With respect to planning and acquisitions of land for development, Rwanda only ranks behind New Zealand and Singapore globally. This is a remarkable achievement that will increase the effectiveness of any future policies. Despite this, Kigali (being the only city in Rwanda with a population greater than 200,000) does not fall into the top decile of the distribution. Its SCS was approximately 1.

Perhaps one of the most interesting discussions is regarding which economic strategies African cities could pursue. Should policies be designed to champion certain industries, as was done in several parts of Asia in recent decades? Or would a laissez-faire approach be more effective? There is not one answer that will apply to all cities in Africa, or even those at the top of the distribution. Land tenure reforms, like those successfully implemented in Rwanda, appear to be a necessary early-stage adoption for the longer-term success of urban areas across Africa.

Increasing access to international trade will help to drive economic efficiencies while allowing the development of the relatively large informal sectors of African economies to continue. As technological progress means that traditionally non-tradeable goods and services are increasingly tradeable, taking a focus on industrial development may no longer be the most desirable option. However, there are still valuable lessons to be learned from international experience, such as how too much vertical integration in a city's economy can increase fragilities.

This report is an attempt to identify the increase in economic concentration among cities in Africa, not a comprehensive overview of all African cities. It focuses only on differences in relative levels of output without considering other differences that may exist between cities. What it finds is that economic activity is concentrated in a minority of African cities and is expected to remain so for at least the next decade.

This is increasingly important for both the private and public sector to recognise, so investments can be made to unlock the vast potential of the continent's rapidly urbanising population.

Appendix A Explaining the Superstar City Statistic

The Superstar City Statistic (SCS) measures the economic concentration of a metropolitan area by dividing its share of national output (Gross Domestic Product, or GDP) to its share of national population. Written formally:

$$\text{SCS} = \frac{\text{metro GDP / national GDP}}{\text{metro population / national population}} \quad (1)$$

Suppose that a nation's GDP, or Y_N, is a sum of the outputs of all of its m metropolitan areas Y_{cm} and j non-metropolitan or rural areas Y_{rj}, such that:

$$Y_N = \sum_0^m Y_{cm} + \sum_0^j Y_{rj} \quad (2)$$

For simplicity, let us assume that a nation only comprises metropolitan areas such that:

$$Y_N = \sum_0^m Y_{cm}$$

This can be relaxed in later stages without issue.

A metropolitan area produces output Y using the inputs technology A, which is determined internationally; institutions I (such as the legal system, etc.), which are determined nationally; and the local stock of labour L; and capital Z. The vector Z includes all types of capital such as physical (machinery, etc.), human (health, education, etc.), social (networks) and managerial (business knowledge, etc.). Agglomeration economies are also included in the vector Z. Note that labour is simply a measure of the population, with the skill level of labour included in the vector Z. The production function takes on a Cobb-Douglas form where the share of technology in the production function is α, the share of institutions is β, and the share of the 'local characteristics' in production is 1 – α – β. For simplicity, set 1 – α – β = δ such that:

$$Y_{cm} = A_i^{\alpha} I_n^{\beta} Z_{cm}{}^{\delta} L_{cm} \quad (3)$$

Note that as L is just a measure of population and does not include the characteristics of the population (such as human capital), it only acts as a 'shifter' in this production function[37].

Now defining the share of national GDP for metropolitan areas m, so that $\xi_m = Y_{cm} / Y_N$. Using a nation comprising only two metropolitan areas as an example, the share of city one's GDP would be:

$$\frac{Y_{c1}}{Y_N} = \frac{Y_{c1}}{Y_{c1} + Y_{c2}} = \frac{A_i^{\alpha} I_n^{\beta} Z_1^{\delta} L_1}{A_i^{\alpha} I_n^{\beta} Z_1^{\delta} L_1 + A_i^{\alpha} I_n^{\beta} Z_2^{\delta} L_2} = \frac{Z_1^{\delta} L_1}{Z_1^{\delta} L_1 + Z_2^{\delta} L_2} \quad (4)$$

37 There is clearly endogeneity in the relationship between L and Z. Further work is needed to define this relationship.

Which can easily be expanded to m number of metropolitan areas so that:

$$\frac{Y_{c1}}{Y_N} = \frac{Y_{c1}}{Y_{c1} + Y_{c2} + \cdots + Y_{cm}} = \frac{Z_1^{\delta} L_1}{\sum_0^m Z_m^{\delta} L_m} \quad (5)$$

Moving on to metropolitan area *m*'s share of the national population:

$$\frac{L_m}{L_N} = \frac{L_m}{\sum_1^m L_m} \quad (6)$$

As shown in (1), we define SCS as a metropolitan area's share of national GDP divided by its share of national population. Thus, the SCS for metropolitan area one is:

$$SCS_1 = \frac{Z_1^{\delta} L_1}{Z_1^{\delta} L_1 + \cdots + Z_m^{\delta} L_m} \Bigg/ \frac{L_1}{L_1 + \cdots + L_m} = \frac{(Z_1^{\delta} L_1)(L_1 + \cdots + L_m)}{(Z_1^{\delta} L_1 + \cdots + Z_m^{\delta} L_m)(L_1)} = \frac{Z_1^{\delta} \sum_1^m L_m}{\sum_1^m Z_m^{\delta} L_m} \quad (7)$$

As can be seen, only the stock of local capital *Z* and population size *L* affect SCS. This is important; both of these are determined locally, thus SCS eliminates national idiosyncratic characteristics such as the legal system, national security and openness to trade. Cities must operate within national jurisdictions, and as such are subject to exogenous restrictions that they are not able to control[38].

Based on the above equation, it is evident that SCS multiplies the vector of localised characteristic for metropolitan area one, Z_1, by the national urban population:

$$\sum_1^m L_m$$

Thus, the numerator applies the capital stock of metropolitan area Z_1 to the national urban population. The denominator is the sum of each population multiplied by its respective capital stock. Thus, if SCS=1, it can be interpreted as that city's capital stock of the metropolitan area being at the national average. Similarly, if SCS>1, the capital stock of the metropolitan area is greater than the national average, and vice versa.

Because this measure focuses on locally determined factors *L* and *Z*, it enables for a more accurate comparison between cities across national boundaries[39]. It also enables for a more accurate comparison between cities of difference sizes, as SCS controls for population. There may be the issue of measurement error skewing the SCS for cities with small populations or output levels, but this is dependent on data rather than methodology.

38 There may be some exceptions to this in countries with one city that is able to dominate the national political conversation, such as those described in Ades and Glaeser (1995).

39 This includes looking at the share of global GDP relative to the share of global population. It is easy to see that if this comparison would be made, national factors *I* would still affect this comparison. Purchasing power parity (PPP) adjustments would also not change this as PPP only adjusts for price levels and not institutional factors such as the legal system and trade policy.

Appendix B The increase in economic concentration among US metropolitan areas

The concentration of economic power in firms, perhaps first noted by Alfred Marshall (Marshall, 1890) and the discussion of the extraordinary profits a businessman 'favoured by genius and good luck' could achieve in the 1870s, has seen renewed interest following Sherwin Rosen (Rosen, 1981), and has since been applied to several topics ranging from the music industry (Krueger, 2019) to the market power of small groups of firms within industries (Autor et al, 2020). However, there has been relatively little focus on what Paul Krugman (Krugman, 1988) hailed as 'the most striking feature of economic geography': the concentration of economic activity in different regions.

The majority of studies on cities tend to focus on city size (Ades and Glaeser, 1995), density (Glaeser and Kahn 2004, Duranton and Puga 2020), or measurements of agglomeration economies (Combes and Gobillon, 2015). However, there has been little focus on the density of economic activity, or the variance in the concentration of economic activity across regions. In a 2018 study, the McKinsey Global Institute (MGI) found that 50 cities accounted for 21% of World GDP[40]. This Appendix builds on the MGI framework by defining a 'superstar statistic' as the share of a city's GDP relative to national urban GDP, divided by its share of urban population[41]. This approach has the benefit of isolating city-level characteristics making for better comparison across national borders[42]. The dataset used is Metropolitan Statistical Areas (MSAs) in the US as of 2018. The findings show that there is an incredible concentration of economic activity in the top percentiles of MSAs as measured by the Superstar City Statistic (SCS), and this has increased over the past two decades. It also finds a lack of mobility at the top and bottom ends of the distribution. Finally, there appears to be at least a modestly positive relationship between city size and economic concentration.

B1 Data and observations

The data used in this analysis is the metropolitan-level dataset for GDP from the Bureau for Economic Analysis (2020) and population from the Census Bureau (2020). GDP data was taken for the years 2018 and 2001, while population was taken from the 2000 census and the estimate for 2018. The sample includes 384 agglomerations defined as MSAs in 2018. Although the definitions of some MSAs have changed since the 2000 census, the data was adjusted so that the physical areas measured (by county) were the same in 2001 and 2018, though some of the smaller centres in 2000 may not have been designated as MSAs. The data was manipulated using the methodology described in the previous section to yield an SCS for each MSA.

40 Manyika et al (2018).

41 This is extrapolated throughout the paper, but in short this is (city GDP/country urban GDP) / (city population/country urban population).

42 This approach corrects for the share of agriculture in GDP, as well as the variance of the urban-rural productivity gap between countries, and isolates city-centric characteristics such that heterogenous national features (such as the legal system, etc.) do not skew the analysis.

The results are displayed in Figure B.1. The 384 MSAs are displayed on the horizontal axis in order of decreasing SCS, which is measured on the vertical axis. The asymmetric distribution of the sample is immediately evident. Of the 384 MSAs, 324 (or 84.4% of the total) fall within one standard deviation of the mean.

If this is expanded to 1.5 standard deviations from the mean, this share grows to 359 (93.5%). Both of these are significantly higher than would be expected in a standard normal distribution.

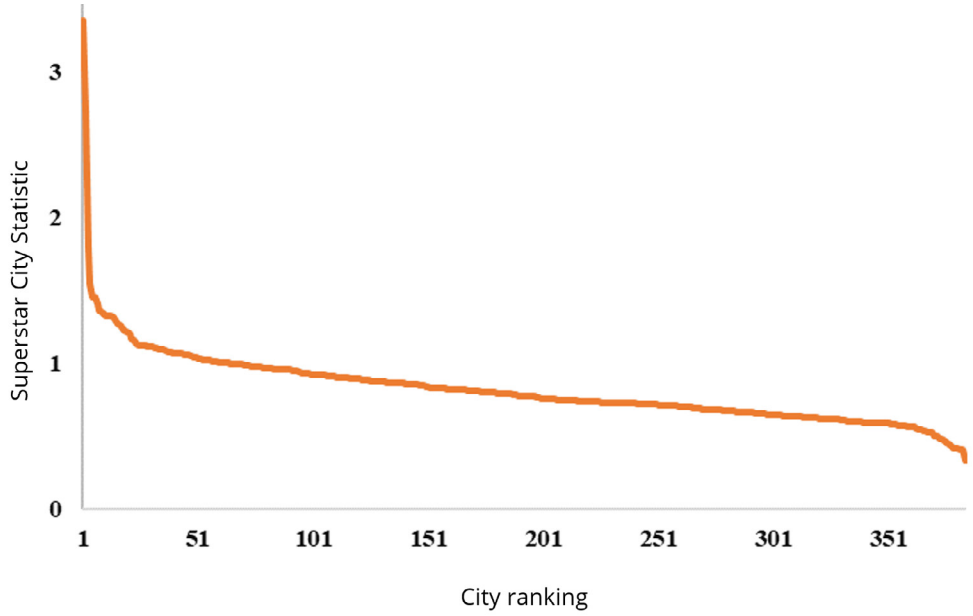


Figure B.1 Concentration of economic power in US metropolitan areas in 2018

The tails are also skewed, particularly at the very top end of the distribution, indicative of a concentration in economic power among a selection of US metropolitan areas. The 4 MSAs – the top 1% of the sample – range from 2.75 (Seattle WA, SCS = 1.54) to 9.65 standard deviations above the mean (Midland TX, SCS = 3.34). The other 2 MSAs in the top 1%, perhaps unsurprisingly, are the tech-centric San Francisco CA (SCS = 1.79, 3.72 std devs) and San Jose CA (SCS = 2.73, 7.28 std devs). Indeed, the top 10 MSAs are generally known as tech, financial, biotech hubs or oil refiners[43]. A full breakdown of the top and bottom 10 MSAs by ranking can be seen in Figure B.2.

Top 10 MSAS (2018)			Bottom 10 MSAS (2018)		
MSA	SCS	Std Deviation	MSA	SCS	Std Deviation
Midland, TX	3.35	9.65	Gadsden, AL	0.47	-1.35
San Jose, CA	2.73	7.28	Daphne, AL	0.45	-1.4
San Francisco, CA	1.79	3.72	Ocala, FL	0.44	-1.45
Seattle, WA	1.54	2.75	Punta Gorda, FL	0.43	-1.48
Boston, MA-NH	1.45	2.4	McAllen, TX	0.42	-1.54
Wheeling, WV-OH	1.45	2.4	Lake Havasu City, AZ	0.41	-1.55
Bridgeport, CT	1.41	2.25	Sebring, FL	0.41	-1.55
New York, NY-NJ-PA	1.35	2.05	Homosassa Springs, FL	0.41	-1.58
Odessa, TX	1.35	2.03	Brownsville, TX	0.4	-1.58
Boulder, CO	1.33	1.95	The Villages, FL	0.33	-1.87

Figure B.2 Top and bottom 10 MSAs in 2018 ranked by SCS

The same treatment was given to the 2000/2001[44] data to observe the change in economic concentration over time. In each period, the data was percentile-ranked by SCS then sorted into deciles. Each decile contains either 38 MSAs (0–10th, 10th, 30th, 40th, 60th, 80th) or 39 MSAs (20th, 50th, 70th, 90th). To highlight the concentration of output at the top end of the distribution, the 99th percentile (4 MSAs) and 90–99th percentiles (35 MSAs) were also separated out. The mean value of SCS, as well as the 95% confidence bands for each grouping, is displayed in Figure B.3.

Figure B.3 shows that the variation in the means between 2001 and 2018 occur in the tails, at the 10th and 90th deciles. Though as a result of the higher degree of variation the difference in decile means of the 2001 and 2018 distributions are only statistically significant for the 10th through 60th deciles. There is also a notable difference among the top 1% of observations, consistent with the hypothesis that economic activity has become more concentrated in a small subset of cities over the past two decades.

43 There is some risk that these are more volatile on a year-to-year basis because of fluctuations in oil prices. This will be true of any metropolitan economy that is dependent on natural resources.

44 Population data is from 2000, GDP from 2001.

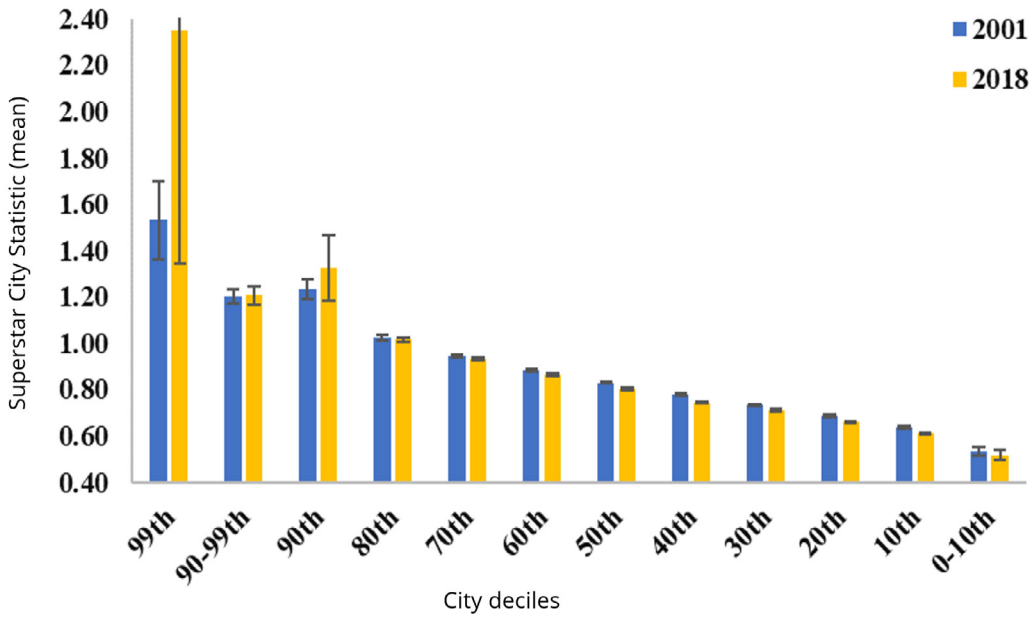


Figure B.3 Mean economic concentration by city decile

	2001				2018			
	Mean	Median	Std Dev	CV	Mean	Median	Std Dev	CV
99th	1.53	1.50	0.12	0.08	2.35	2.26	0.72	0.31
90-99th	1.20	1.16	0.09	0.07	1.21	1.17	0.12	0.10
90th	1.23	1.17	0.14	0.11	1.32	1.21	0.43	0.33
80th	1.02	1.02	0.03	0.03	1.01	1.01	0.03	0.03
70th	0.94	0.94	0.02	0.02	0.93	0.92	0.02	0.02
60th	0.88	0.88	0.02	0.02	0.86	0.86	0.02	0.02
50th	0.83	0.83	0.01	0.02	0.80	0.80	0.02	0.02
40th	0.78	0.78	0.02	0.02	0.74	0.74	0.01	0.02
30th	0.73	0.73	0.01	0.02	0.71	0.71	0.01	0.02
20th	0.69	0.69	0.01	0.02	0.66	0.66	0.02	0.02
10th	0.64	0.64	0.02	0.03	0.61	0.61	0.01	0.02
0-10th	0.53	0.56	0.06	0.11	0.52	0.54	0.07	0.13
Full sample	0.83	0.81	0.20	0.24	0.82	0.77	0.26	0.32

Figure B.4 Descriptive statistics 2001 and 2018

Figure B.4 displays some descriptive statistics for the datasets. The coefficient of variation is indicated by CV. There is little difference in the means and standard deviations between the 2018 and 2001 data below the 90th decile, though interestingly in both datasets the mean falls below the median in the 0–10th decile and standard deviation increases markedly, indicating some degree of downwards skew in this group.

The first notable difference occurs in the 90th percentile, where the mean SCS increases from 1.23 in 2001 to 1.32 in 2018, and the difference between the mean and median increases from 0.05 in 2001 to 0.12 in 2018. This is indicative of significantly more upwards skew in this decile. The standard deviation also increases sharply, from 0.14 in 2001 to 0.43 in 2018 and CV triples from 0.11 to 0.33.

Upon closer inspection, much of this change comes as a result of an increase in economic concentration in the top percentile. The mean SCS in the 99th percentile rose from 1.53 in 2001 to 2.35 in 2018, the standard deviation from 0.12 to 0.72, and CV from 0.08 to 0.31.

As can be seen in Figure B.4 as well as Figure B.3, there is very little change in the 90th–99th percentile groups between 2001 to 2018. This result indicates an extreme concentration in economic activity at the very top of the distribution.

Figure B.5 gives an indication in the 'mobility' of cities by showing the conditional probability of ending up in a specific decile in 2018 having started in a specific decile in 2001. There appears to be a fair amount of movement in the middle of the distribution, but the tails are quite sticky. If a city started in the 90th or 0–10th deciles in 2001, it has a 60% chance of being there in 2018. These probabilities are substantially higher than anywhere else in the distribution, indicative of a sort of 'Matthew effect'[45].

		2018											
		99th	90-99th	90th	80th	70th	60th	50th	40th	30th	20th	10th	0-10th
2001	99th	25.00%	50.00%	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	90-99th	8.57%	48.57%	57.14%	17.14%	5.71%	5.71%	8.57%	0.00%	2.86%	0.00%	0.00%	2.86%
	90th	10.26%	48.72%	58.97%	17.95%	5.13%	5.13%	7.69%	0.00%	2.56%	0.00%	0.00%	2.56%
	80th	0.00%	18.42%	18.42%	31.58%	26.32%	10.53%	10.53%	2.63%	0.00%	0.00%	0.00%	0.00%
	70th	0.00%	12.82%	12.82%	17.95%	23.08%	12.82%	15.38%	2.56%	5.13%	7.69%	0.00%	2.56%
	60th	0.00%	2.63%	2.63%	15.79%	23.68%	18.42%	21.05%	10.53%	5.26%	0.00%	2.63%	0.00%
	50th	0.00%	2.56%	2.56%	10.26%	15.38%	17.95%	15.38%	20.51%	7.69%	5.13%	2.56%	2.56%
	40th	0.00%	2.63%	2.63%	2.63%	5.26%	21.05%	10.53%	28.95%	15.79%	7.89%	5.26%	0.00%
	30th	0.00%	0.00%	0.00%	0.00%	0.00%	7.89%	10.53%	13.16%	36.84%	23.68%	5.26%	2.63%
	20th	0.00%	0.00%	0.00%	2.56%	2.56%	5.13%	5.13%	10.26%	17.95%	20.51%	25.64%	10.26%
	10th	0.00%	2.63%	2.63%	0.00%	0.00%	0.00%	2.63%	10.53%	7.89%	26.32%	31.58%	18.42%
	0-10th	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.63%	0.00%	0.00%	10.53%	26.32%	60.53%

Figure B.5 Conditional probability of ending up in decile x in 2018 on 2001 decile

45 Best known as 'the rich get richer and the poor get poorer'. For further discussion see Merton (1968).

2001 Decile	Score	Percentile
99th	1.44	98.48
90-99th	1.14	93.69
90th	1.15	93.94
80th	1.00	84.09
70th	0.92	72.98
60th	0.88	66.92
50th	0.83	60.10
40th	0.79	51.52
30th	0.71	35.10
20th	0.68	29.80
10th	0.65	22.98
0-10th	0.56	6.31

This result is in line with discussions on the persistence of economic concentration over the long run, such as in Krugman (1988).

It is also further illustrated in Figure B.6, which shows the expected SCS of an MSA in 2018 based on its 2001 decile, and its percentile-rank this SCS would place it in for 2018[46].

Figure B.7 charts this relationship.

There is clearly a strong, positive relationship between an MSA's 2001 and (expected) 2018 decile. This too conforms with the persistence discussed in Krugman (1988) and appears to indicate a lack of mobility for cities over time.

46 The framework is similar to that used in Chetty et al (2014).

Figure B.6 Expected 2018 score and percentile based on 2001 decile

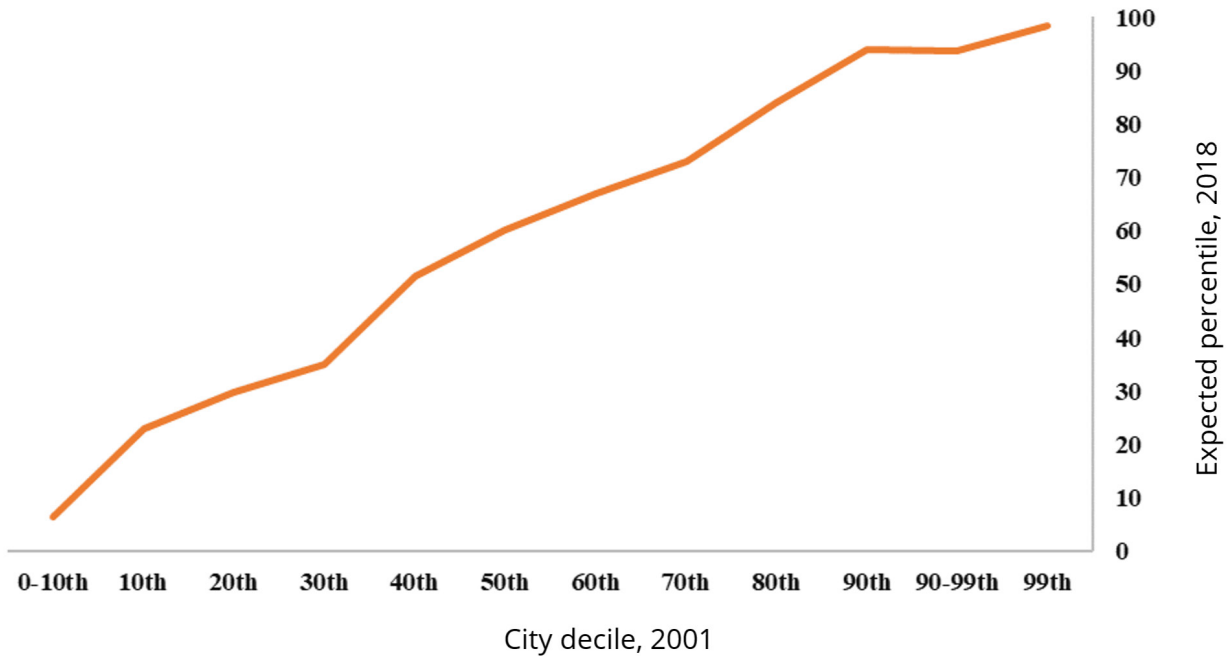


Figure B.7 Expected outcome in 2018 based on decile ranking in 2001

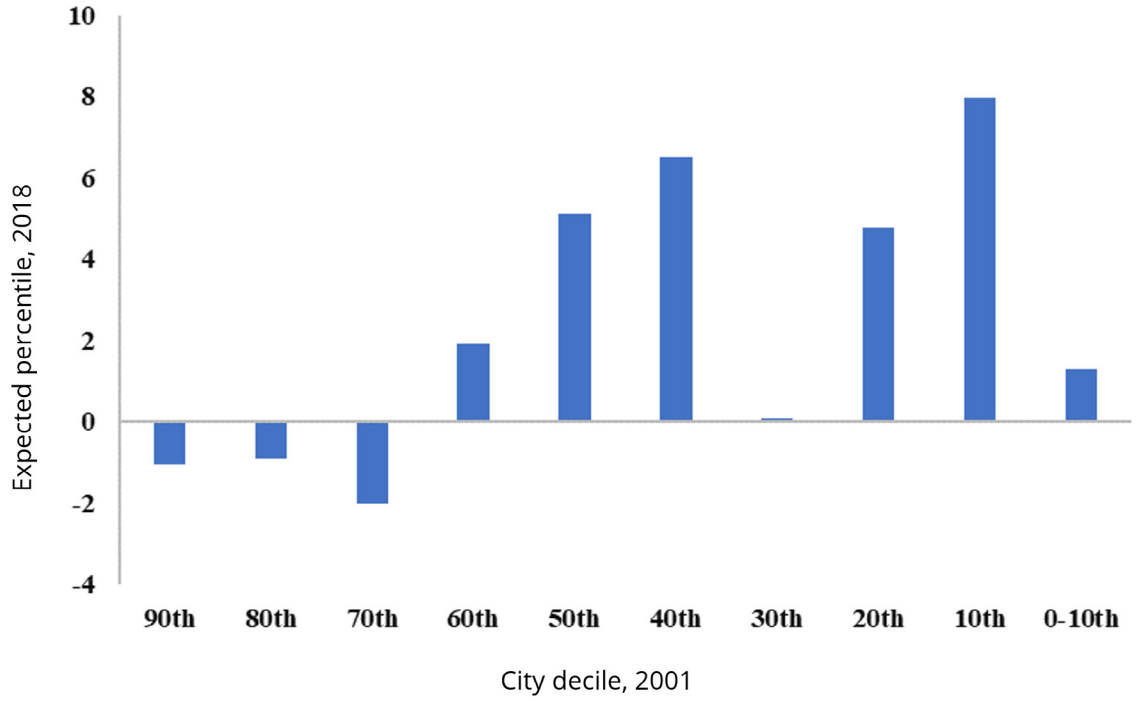


Figure B.8 Distance from midpoint of 2001 decile in 2018

Figure B.8 offers an alternative view, showing the distance in the expected 2018 percentile-rank to the midpoint of the 2001 decile. There appears to be some degree of mobility between the 10th and 50th deciles, though the 30th decile is an outlier, and the effects seem to fade after the 50th decile. This is in line with the previous observation that ranking appears to be more persistent in the tails of the distribution.

This presents an interesting case for policymakers looking to develop regions using place-based policies. Kline and Moretti[47] demonstrated that place-based policies to boost manufacturing by the Tennessee Valley Authority were locally effective but cancelled out in aggregate. However, if the mobility of cities at the low end of the distribution is impaired, it could provide justification for a 'big push' policy to be directed at specific regions. It appears this would be more effective for regions with a large cluster of cities in the bottom decile.

Figure B.9 displays the number of MSAs[48] by state in the top and bottom deciles of the 2018 distribution. Of the 38 MSAs in the bottom decile, 9 are located in Florida, specifically central Florida. A 'big push' policy would be more effective in this region, and could boost the long-term mobility of the bottom decile of the distribution, though a more complete spatial analysis is needed.

47 See Kline and Moretti (2013).

48 Defined by the state in which the principal city of the MSA is located.

These results may have a slightly different interpretation for developing countries. World Bank[49] research has suggested that in Africa, cities are stuck in a low urban development trap. If outcomes for cities in the top decile are persistent, this could justify 'big push' policies directed at the top performing African cities. These strategies would be more effective if these cities face fewer market failures and other obstacles to development to 'spring' them from the urban development trap[50].

B2 City size

To look at the relationship between city size and economic concentration, the 2018 sample was divided into five groups based on population.

- Extra-large (XL) cities were those MSAs with a population of more than 10 million.
- Large (L) cities have populations between 1 and 10 million.
- Medium (M) cities have populations between 500,000 and 1 million.
- Small (S) cities have populations between 200,000 and 500,000.
- Extra-small (XS) cities have populations less than 200,000.

The sample consisted of 2 extra-large cities (New York & LA), 51 large cities, 56 medium cities, 115 small cities, and 160 extra-small cities.

49 See Lall, Henderson, Venables (2018).
50 Ibid.

State	Top Decile (2018)	Bottom Decile (2018)
Alabama	0	3
Arizona	0	2
Arkansas	0	1
California	6	1
Colorado	3	0
Connecticut	3	0
Delaware	1	0
Florida	0	9
Georgia	0	1
Idaho	0	2
Illinois	2	0
Indiana	2	1
Iowa	2	0
Louisiana	1	1
Maryland	1	0
Massachusetts	1	0
Michigan	0	2
Minnesota	1	0
New Jersey	1	0
New Mexico	0	1
New York	1	0
North Carolina	1	1
Ohio	1	1
Oregon	0	1
Pennsylvania	1	2
South Carolina	0	3
South Dakota	1	0
Tennessee	0	2
Texas	5	2
Utah	1	1
Washington	1	0
West Virginia	1	1
Wisconsin	1	0
Wyoming	1	0
Totals	39	38

Figure B.9 State representation in top and bottom deciles

	XL	L	M	S	XS
99th	0.00%	5.88%	0.00%	0.00%	0.63%
90-99th	100.00%	23.53%	8.93%	6.96%	5.00%
90th	100.00%	29.41%	8.93%	6.96%	5.63%
80th	0.00%	21.57%	8.93%	10.43%	6.25%
70th	0.00%	19.61%	10.71%	7.83%	8.75%
60th	0.00%	13.73%	8.93%	11.30%	8.13%
50th	0.00%	9.80%	17.86%	12.17%	6.25%
40th	0.00%	1.96%	12.50%	13.04%	9.38%
30th	0.00%	0.00%	10.71%	12.17%	11.25%
20th	0.00%	1.96%	8.93%	10.43%	13.13%
10th	0.00%	1.96%	7.14%	5.22%	16.88%
0-10th	0.00%	0.00%	5.36%	10.43%	14.38%

Figure B.10 Share of city size by decile

Figure B.10 displays the distribution of cities by decile. Both of the extra-large cities are in the 90th decile. The 38 cities in the 80th decile are comprised of 21.6% of the 51 large cities (11 large cities), 8.9% of the 56 medium cities (five medium cities), 10.4% of the 115 small cities (12 small cities) and 6.3% of the 160 extra-small cities (10 extra-small cities). This interpretation is preferred to a simple distribution of cities within each decile, given there is more than three times the number of extra-small cities to large cities. Thus, simply looking at the percentage breakdowns of the cities by size would overstate the weightings for smaller cities in each decile relative to larger cities[51].

Figure B.10 is colour coded to show the relative intensity of each city size in a particular decile.

There appears to be a positive relationship between city size and concentration of economic activity: larger cities have a higher degree of economic concentration than smaller cities.

This is a fairly intuitive relationship and one that is supported in the literature[52]. However, this should not be interpreted as an absolute relationship. As is evident in Figure B.10, medium, small and extra-small cities appear in every decile and one of the four cities in the 99th percentile is classified as extra-small (Midland, TX). Particularly when a city specialises in the production of tradeable goods that exhibit significant economies of scale, require little labour and have intangible capital as a major input, it is possible for a smaller city to see a significant concentration of economic activity.

51 If just the distribution of cities within each decile was considered, the 80th decile would have comprised of 29% large, 13% medium, 32% small and 26% extra-small, which clearly overstates the relative weighting of small cities in the sample relative to large cities.

52 Segal (1974) among others.

Appendix C The dataset

The data for African city GDP and population, as well as the urban shares of national population, were taken from the McKinsey Cityscope 4.0 database. Cities are defined as Metropolitan Statistical Areas (MSAs), following the definition of MSAs by the United Nations. This is a key distinguishing point, as the city proper or urban agglomeration may not account for some commuters in the population statistics but would still account for them in output (GDP) statistics, which would upwardly bias the data. The degree of upward bias would vary by the share of commuters and would likely result in endogeneity bias in the model.

Cities included in the dataset are MSAs with a minimum population of 200,000. To account for the high degree of productivity differences between urban and rural areas in Africa, an MSA's share of GDP and population was taken as share of national urban GDP and national urban population. Therefore, the equation for SCS in Appendix A is amended to:

$$SCS = \frac{\text{metro GDP / national urban GDP}}{\text{metro population / national urban population}}$$

Using the methodology outlined in Appendix A, it is evident that, if applied universally, this doesn't alter the interpretation of SCS. The national urban GDP was taken by summing the GDP of all the cities included in the Cityscope 4.0 database. A similar method was used to calculate the national urban population. For consistency, only MSAs with a population of at least 200,000 were included to sum both the GDP and population figures at a national level. The number of MSAs included for each nation can be provided upon request.

There were 124 cities included in the sample, representing a significant portion (27%) of the 456 cities in the Middle East and Africa included in the Cityscope database (235 in Sub-Saharan Africa and 221 in the Middle East and North Africa). There were 96 cities from Sub-Saharan Africa (41% of the total database from Sub-Saharan Africa) and 28 cities from North Africa (13% of the total database from the Middle East and North Africa). The distribution of cities by country included in the sample is indicated in Figure C.1.

City selection was based on a stratified sample methodology. Cities were sorted into four categories based on population size:

- extra-large (population greater than 10 million)
- large (population 1 to 10 million)
- medium (population 500,000 to 1 million) and
- small (population 200,000 to 500,000).

There were only four extra-large cities in the dataset: Cairo (Egypt), Johannesburg (South Africa), Kinshasa (Democratic Republic of the Congo), and Lagos (Nigeria), so the entire database of cities of this population size was included. For the other three categories, the top and bottom 20 cities by GDP (purchasing power parity (PPP) adjusted) were selected. For example, the 40 large cities in the sample are comprised of the 20 cities with populations between 1 and 10 million with the highest GDP, and the 20 cities with populations between 1 to 10 million with the lowest GDP. A similar selection was conducted for the 40 medium and 40 small cities included in the sample.

Country	Number of cities included
Algeria	4
Angola	5
Benin	1
Burkina Faso	1
Burundi	1
Cameroon	5
Central African Republic	1
Ivory Coast	3
Democratic Republic of the Congo	5
Egypt	13
Eritrea	1
Ethiopia	3
Gabon	1
Gambia	1
Ghana	2
Guinea	2
Kenya	1
Libya	2
Madagascar	3
Malawi	2
Morocco	9
Mozambique	4
Niger	1
Nigeria	29
Rwanda	1
Senegal	1
Sierra Leone	1
Somalia	3
South Africa	9
Sudan	2
Tanzania	2
Uganda	3
Zambia	1

Figure C.1
Number of cities included in the SCS sample by country

There is the possibility that this non-randomised selection approach results in a sampling bias. First, the share of large cities (population greater than one million) is likely overstated in the sample relative to the share of these cities in the population (the dataset), whereas the share of small cities (population less than one million) is likely understated.

Second, the manner in which the cities were selected (top and bottom 20 by GDP at each population size) likely results in a hollowing out of the middle. That is, only the cities at the extremes are selected, which will emphasise the more extreme results.

This is not as big an issue for this particular study as the focus on superstar cities emphasises the extreme results. There is a caveat to this, however. This approach will likely upwardly bias the standard deviation of SCS in the sample (relative to the standard deviation of the population), so looking at the results in terms of the sample standard deviation will underestimate the extremes.

	African cities sample	US study	Difference
Mean	0.8372	0.8184	0.0188
Median	0.738	0.7717	-0.0336
Std. deviation	0.3729	0.262	0.1109

Figure C.2 Comparison between African cities sample and US cities

To compensate for this, the standard deviation for SCS from a study of 384 US MSAs is used (see Appendix D). It is possible that this approach would also affect the sample mean and median of SCS, though in which direction is unclear. As a result, the sample of African cities is compared with the mean and median from the study of US MSAs. The results are shown in Figure C.2.

As can be seen in Figure C.2, there is little difference between the mean of the US study and the sample of African cities. The difference between the medians is slightly greater, however this is likely a result of factors explained in the paper (a large concentration of cities with very low SCS). There appears to be a significant difference in the standard deviations in the two studies. This is why the US study is referenced; it includes the entire population of MSAs rather than just a sample.

A further issue may arise with this approach that could have a greater effect on the results. There is the possibility that in each population grouping, a city with a smaller population and GDP just outside of the top 20 in aggregate may be omitted. Such a city would likely rank in the top deciles of this study. The risk of this is greatest in the 1 to 10 million population grouping given the larger spread of the aggregate population (9 million) versus the medium grouping (500,000) and small grouping (300,000).

For example, it is possible that the smallest city in the large grouping, which would have a population just over 1 million, could have the 21st largest GDP, and as a result would not be included in the sample. This issue needs further investigation.

The population and GDP data for 2020 was estimated by MGI prior to the outbreak of COVID-19. Data for 2030 was forecast by MGI prior to the COVID-19 pandemic. The COVID-19 outbreak, and subsequent economic shock, likely had a significant impact on the output and population variables, though it is unclear whether this affects city ranking and economic concentration across the continent.

Appendix D Ranking Africa's cities

Rank	City	Country	SCS	Percentile
1	Oran	Algeria	2.26	100
2	Port Harcourt	Nigeria	2.15	99
3	Pretoria	South Africa	2.01	98
4	Aba	Nigeria	1.72	98
5	Nairobi	Kenya	1.65	97
6	Mwanza	Tanzania	1.58	96
7	Hargeisa	Somalia	1.5	95
8	Casablanca	Morocco	1.46	94
9	Luanda	Angola	1.39	94
10	Tripoli	Libya	1.38	93
11	Maputo	Mozambique	1.35	92
12	Khartoum	Sudan	1.35	91
13	Blantyre	Malawi	1.34	90
14	Kinshasa	Democratic Republic of the Congo	1.32	90
15	Kampala	Uganda	1.3	89
16	Agadir	Morocco	1.25	88
17	Sekondi-Takoradi	Ghana	1.22	87
18	Antananarivo	Madagascar	1.2	86
19	Bobo Dioulasso	Burkina Faso	1.18	85
20	Cairo	Egypt	1.18	85
21	Cape Town	South Africa	1.17	84
22	Dar es Salaam	Tanzania	1.15	83
23	Abidjan	Côte d'Ivoire	1.14	82
24	Yaoundé	Cameroon	1.12	81
25	Douala	Cameroon	1.11	81
26	Ibadan	Nigeria	1.11	80
27	Bujumbura	Burundi	1.08	79
28	Addis Ababa	Ethiopia	1.08	78
29	Zaria	Nigeria	1.08	77
30	Johannesburg	South Africa	1.06	77
31	Lagos	Nigeria	1.05	76
32	Accra	Ghana	1.03	75

33	Kigali	Rwanda	1.03	74
34	Banjul	Gambia	1.02	73
35	Durban	South Africa	1.02	73
36	Libreville	Gabon	0.99	72
37	Abuja	Nigeria	0.99	71
38	Asmara	Eritrea	0.99	70
39	Bangui	Central African Republic	0.98	69
40	Meknes	Morocco	0.96	69
41	Osogbo	Nigeria	0.94	68
42	Welkom	South Africa	0.94	67
43	Alexandria	Egypt	0.94	66
44	Jimma	Ethiopia	0.92	65
45	Dire Dawa	Ethiopia	0.9	65
46	Jos	Nigeria	0.9	64
47	Touba	Senegal	0.85	63
48	Lilongwe	Malawi	0.82	62
49	Tshikapa	Democratic Republic of the Congo	0.81	61
50	Makurdi	Nigeria	0.81	60
51	Abakaliki	Nigeria	0.81	60
52	Katsina	Nigeria	0.81	59
53	Asaba	Nigeria	0.81	58
54	Iwo	Nigeria	0.81	57
55	Gombe	Nigeria	0.81	56
56	Sagamu	Nigeria	0.81	56
57	Marrakesh	Morocco	0.79	55
58	Nador	Morocco	0.76	54
59	Enugu	Nigeria	0.75	53
60	Maiduguri	Nigeria	0.75	52
61	Abomey	Benin	0.75	52
62	Nampula	Mozambique	0.74	51
63	Bouake	Ivory Coast	0.74	50
64	Beni Mellal	Morocco	0.73	49
65	Bafoussam	Cameroon	0.72	48
66	Chlef	Algeria	0.71	48
67	Bloemfontein	South Africa	0.71	47

68	Soshanguve	South Africa	0.71	46
69	N'dalatando	Angola	0.7	45
70	Gagnoa	Ivory Coast	0.68	44
71	Vereeniging	South Africa	0.66	44
72	Umuahia	Nigeria	0.65	43
73	Yola	Nigeria	0.65	42
74	Gusau	Nigeria	0.65	41
75	Pietermaritzburg	South Africa	0.64	40
76	Bukavu	Democratic Republic of the Congo	0.63	40
77	Likasi	Democratic Republic of the Congo	0.63	39
78	Ife	Nigeria	0.63	38
79	Kenitra	Morocco	0.63	37
80	Djelfa	Algeria	0.62	36
81	Kolwezi	Democratic Republic of the Congo	0.62	35
82	Kano	Nigeria	0.62	35
83	Bilbeis	Egypt	0.61	34
84	Kafr el-Sheikh	Egypt	0.6	33
85	Manéah	Guinea	0.6	32
86	Lobito	Angola	0.6	31
87	Kuito	Angola	0.6	31
88	Garoua	Cameroon	0.6	30
89	El Arish	Egypt	0.6	29
90	Hurghada	Egypt	0.59	28
91	Oujda	Morocco	0.58	27
92	Banha	Egypt	0.58	27
93	Blida	Algeria	0.57	26
94	Al-Khusus	Egypt	0.57	25
95	El-Mahalla El-Kubra	Egypt	0.57	24
96	Tanta	Egypt	0.57	23
97	Mansoura	Egypt	0.57	23
98	Helwan	Egypt	0.57	22
99	Maroua	Cameroon	0.55	21
100	Kikwit	Democratic Republic of the Congo	0.54	20
101	Ilorin	Nigeria	0.54	19
102	Ogbomosho	Nigeria	0.54	19

103	Lafia	Nigeria	0.54	18
104	Ijebu Ode	Nigeria	0.54	17
105	Gboko	Nigeria	0.54	16
106	Minna	Nigeria	0.54	15
107	Saurimo	Angola	0.53	15
108	Xai-Xai	Mozambique	0.52	14
109	Tete	Mozambique	0.52	13
110	Nzerekore	Guinea	0.52	12
111	Salé	Morocco	0.49	11
112	Onitsha	Nigeria	0.49	10
113	Asyut	Egypt	0.47	10
114	Toliara	Madagascar	0.46	9
115	Fianarantsoa	Madagascar	0.45	8
116	Bo	Sierra Leone	0.41	7
117	Berbera	Somalia	0.4	6
118	Misratah	Libya	0.39	6
119	Kismayo	Somalia	0.38	5
120	Port Sudan	Sudan	0.36	4
121	Zinder	Niger	0.34	3
122	Ndola	Zambia	0.33	2
123	Kasangati	Uganda	0.31	2
124	Kira Town	Uganda	0.27	1

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Americas, Europe, Middle East & Africa
aemea@rics.org

Asia Pacific
apac@rics.org

United Kingdom & Ireland
contactrics@rics.org

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