



## Chapter 6

# Scaling up and coordinating investments in physical structures and infrastructure

At the same time as they pursue the recommendations in chapter 5, African cities have an urgent need to improve two sets of urban structures — physical and infrastructural — given that they are chronically underserved by them. Infrastructure coverage is actually declining on some metrics, across the region.

In 2010, for example, when the urban population was 37 percent, only 34 percent of urban residents had access to piped water, down from 43 percent in 1990, when the urbanization rate was 30 percent. In 2006, the Africa Infrastructure Country Diagnostic (AICD) estimated that addressing the infrastructure backlog would require \$68–\$93 billion a year over the next three decades, a third of which would be for maintenance.

At the same time as they pursue the recommendations in chapter 5, African cities have an urgent need to improve two sets of urban structures — physical and infrastructural — given that they are chronically underserved by them (Banerjee and Morella 2011). Infrastructure coverage is actually declining on some metrics, across the region (Banerjee and others 2009). In 2010, for example, when the urban population was 37 percent, only 34 percent of urban residents had access to piped water, down from 43 percent in 1990, when the urbanization rate was 30 percent (UNICEF/WHO 2012). In 2006, the Africa Infrastructure Country Diagnostic (AICD) estimated that addressing the infrastructure backlog would require \$68–\$93 billion a year over the next three decades, a third of which would be for maintenance (Foster and Briceño-Garmendia 2010).

Physical structures and infrastructure pose special challenges. The first is path dependence: The costs of developing housing, infrastructure, and industrial premises depend on sequencing. Making infrastructure investments first, followed by investments in housing and then in industrial premises, reduces the cost of all three, because sewerage, drainage, electricity, clean water, and connectivity are cheaper to provide at scale than if they are added to houses and factories individually and at a later date (Collier 2016). Furthermore, urban structures share a “putty-clay” quality: Once constructed, they are difficult to modify and can stay in place for more than 150 years (Hallegatte 2009).

A second challenge is interdependence among investments in physical structures and infrastructure. For firms, the productivity of premises depends on the proximity of infrastructure, workers, and customers. For households, the utility of housing depends on

firms’ investments in accessible jobs. And any social return on public infrastructure depends on the proximity of housing to premises. For example, a rapid transit system is more viable at higher densities. Policies need to leverage complementarities and manage coordination failures that lead to single-sector interventions that hinder economic density.

Effective coordination will therefore be crucial to African cities’ success in managing path dependence and interdependence. A city’s ability to make early and coordinated investments directly determines its later appeal to firms considering their own investments in the urban economy. Only efficient infrastructure — and service provision — will generate economic density and improve livability, job market matching, and productivity. Inefficient structures can set back urban development for decades.

Much of a structure’s value is determined by complementarities with other structures in the neighborhood or city. The first structures built will dictate the options for further investments in the vicinity: Path dependence implies that investors need to anticipate what other structures will be built nearby. These expectations are self-fulfilling — investments affect expectations, which in turn affect investments (see chapter 4). The problems of path dependence and interdependence are all the more pressing because of this circularity.

This chapter provides insights from recent research on African cities that examines how early infrastructure shapes urban structures; how road investment can stimulate private investment in structures and achieve other citywide gains; how public goods can enhance livability; and what African cities will need to do to finance lumpy and huge infrastructure investments.

## Investing early in infrastructure to shape urban structures

One reason for the early installation of infrastructure is that it is a coordinating device — an irreversible, and therefore credible, commitment that is highly visible and so generates common knowledge. Another reason is that, if postponed until after population settlement, it is far more expensive and difficult to install. It is more costly because all the services that need to be located underground are easier to install at scale on clear sites rather than retrofitted piecemeal beneath (or over or around) existing structures. It is harder because the inevitable disruption to private homes generates indignant political protests. For example, Freetown in Sierra Leone grew rapidly during the civil war of 1991–2002, when the government was

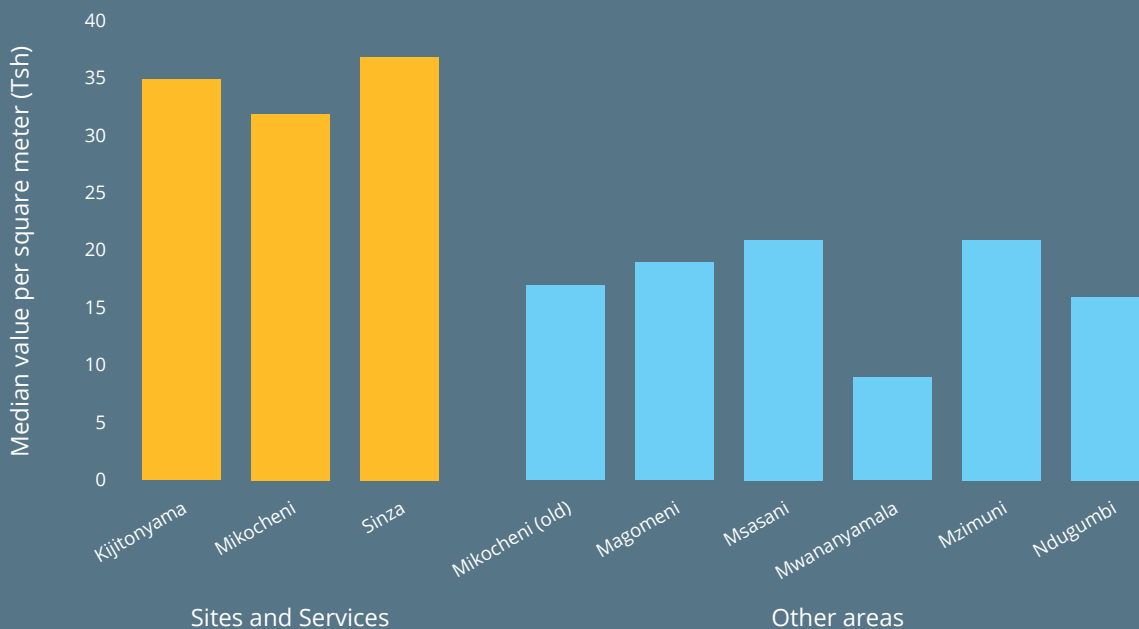
unable to provide new infrastructure. Now that people have settled all urban spaces, local opposition to road construction perpetuates the severe lack of roads.

A research project carried out for this study examines the longer-term benefits of “sites and services” projects that the World Bank used in the 1970s and 1980s to lay down infrastructure ahead of growth of urban settlements (Regan and others 2016). Many of these projects were undertaken with the idea of preventing slum formation or setting up durable foundations for slum upgrading into formal neighborhoods. World Bank projects covered tens of thousands of households in over 20 neighborhoods



FIGURE 6.1

Land values of de novo development projects are higher than values in other neighborhoods of Dar es Salaam, including rich ones



Source: Regan and others 2016.

in cities in Brazil, El Salvador, Jamaica, Peru, Senegal, Tanzania, Thailand, and Zambia. Both types of sites and services projects — building on empty, unpopulated lands (known as de novo construction) and upgrading squatter settlements — included infrastructure investment in roads, electricity, water, and public buildings (schools, clinics, community centers, etc.). The projects were discontinued during the late 1980s because their costs were high, despite anecdotal evidence that they had beneficial long-term impacts.

Researchers evaluated the long-run outcomes of both types of projects on neighborhoods, including the costs and benefits of each program. Benefits included whether infrastructure investments increased the value of certain areas and whether and how each type of project shaped the urban landscape. In the long run, there is an expectation that the sites and services programs would increase land values, which translates into a potential tax base. Slum areas have low land value and require recurrent investments in upgrading.

In Dar es Salaam, sites with de novo development projects have higher land values than land in other parts of city, including rich neighborhoods, partly because the sites and services areas have a higher building footprint to plot area ratio (figure 6.1).

The research also shows that plots are bigger where investment was made ahead of settlement (as in Sinza, shown in the upper left of figure 6.2). These projects have higher land value per square meter than projects in upgraded areas (such as Manzese, shown in the bottom right), where roads are disorganized, plots are small and irregular, and the cost-benefit ratio of valuing for tax collections would be prohibitive. The sites and services plans drawn in the 1970s closely match the shape of today's road network, showing that investment in infrastructure is enduring, shapes urban landscapes, and leads to higher land values, which are taxable and can finance future investments.



FIGURE 6.2

## Differential impacts of de novo and upgrading projects in Dar es Salaam



Source: Regan and others 2016.

Note: The upper left of the photograph shows Sinza, a de novo project. The bottom right shows Manzese, an upgrading project.





## Leveraging road investment

Serious transportation problems are likely to have major implications for the overall economic performance of a city. They reduce the connectivity of firms to workers, firms to other firms, and firms to consumers — and with it both the livability and the productivity of the city. Economic theory and empirical evidence from around the world indicate that a reduction in transportation costs — which could be brought about by road investments or other improvements, such as bus rapid transit (discussed below) — can help increase connectivity between business and residential areas, improving intracity mobility and reducing commuting costs (Fujita and Ogawa 1982; Lucas and Rossi-Hansberg 2002; Glaeser and Kohlhase 2004; Srinivasan and Bhat 2005; Liu 2005; Owen and Phillips 1987).

Reductions in transportation costs and gains in mobility foster land use changes and economic growth as the city moves to a new equilibrium of urban land use patterns (Grover Goswami and Lall 2016). Gakenheimer (1999) suggests that cities in developing countries may have stronger

transportation–land use relationship than cities in more developed countries, because of weaker land use controls; the impacts on land use from road or other transportation investments are therefore likely to be more immediate. What is needed is the capacity to manage the land use shifts that are put into motion by transportation infrastructure (Cervero 2013). Ideally, such investments could be used to match land development to feasible transportation capacity, creating a more efficient balance between jobs and housing and giving workers access to a larger number of jobs (Srinivasan and Bhat 2005).

### *Bus rapid transit: One option among many*

International evidence shows that bus rapid transit (BRT) systems can reduce commuting times. In Guangzhou (China) the introduction of the BRT in 2010 reduced travel times by 29 percent for bus riders and 20 percent for private car commuters. The change — readily apparent in figure 6.3 — has yielded total savings of 52 million hours a year, valued at RMB 158 million (\$23 million) (Suzuki, Cervero, and Luchi 2010).

FIGURE 6.3

Area around the Gangding station, in Guangzhou, China, before and after construction of the bus rapid transit system



Source: Suzuki Cervero, and Luchi 2013.

In Bogota, the first BRT line reduced travel time by 15 minutes per passenger day (Hidalgo and Yepes 2004); the first and second lines reduced travel time by 12–14 minutes per passenger day (about 19 percent) (Perdomo, Castañeda, and Mendieta 2010). BRT users in Istanbul can save 28 days' worth of commuting a year by shifting to BRT (World Bank 2015). In Johannesburg, the BRT reduce travel times 13 minutes each way (Venter and Vaz 2011, cited by EMBARQ 2013). In Lagos commuting time fell by an average of 25 minutes along a 22-kilometer corridor and wait time was reduced from 45 minutes to 10 (Peltier-Thiberge, 2015).

Other benefits of BRT are reductions in pollution and improved road safety. Bogota's BRT (TransMilenio) and new regulations on fuel quality reduce CO2 emissions by an estimated 1 million tons a year. After

implementation of the BRT, SO2 emissions declined 43 percent, NOx 18 percent, and particulate matter 12 percent (Turner and others 2012, cited in EMBARQ 2013). Car crashes and injuries fell in two of the system's main corridors (Bocarejo and others 2012, cited in EMBARQ 2013). In Lagos, the BRT project reduced CO2 emissions by 13 percent and greenhouse gas emissions by 20 percent (Peltier-Thiberge 2015).

Having boomed since the early 2000s, especially in Latin America, BRTs are starting to grow in African cities. Four were recently implemented, in Lagos (2008), Johannesburg (2009), Cape Town (2011), and Dar es Salaam (2016). Together the four systems have 104 kilometers of exclusive bus lanes. South Africa's urban BRTs have underperformed (figure 6.4). BRT projects indeed have great potential — but they must be carefully planned and implemented (box 6.1).



BOX 6.1

## Bus rapid transit: Successful if handled with care

Less often noticed have been the pitfalls and shortcomings of these and other BRT projects. A World Bank review reveals key determinants of success along with certain challenges:

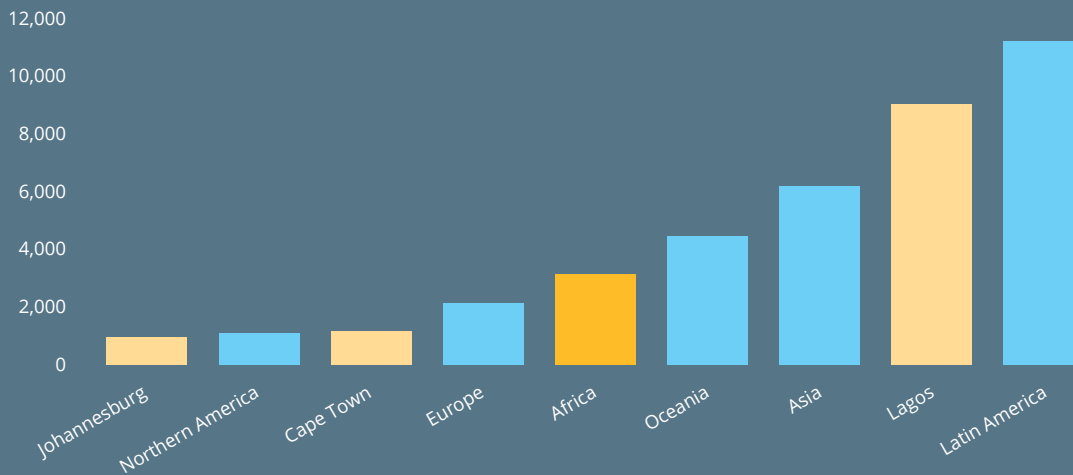
- Bureaucracy was circumvented. In all 11 cities studied, planning and implementation teams were formed outside existing public structures, to avoid bureaucratic obstructions.
- Political leadership was on board. Projects went forward rapidly in cities where the mayor or other political leaders had a clear vision for BRT (Bogota, Curitiba, Jakarta, and Ecuador's Guayaquil). Projects were stalled, sometimes for years, in cities where no such political commitment was present.
- Lead times were reduced to match political timetables, but the quick schedule produced gaps in planning. Steps toward project completion were hastened so that elected officials could claim credit before the end of their terms in office. As a result, crucial institutional, legal, and financial issues were sometimes neglected — though BRT planners gave thought to busway designs (median or curbside), platform types (high or low), fuel technologies (diesel or compressed natural gas), and fare collection mechanisms (on board or prepaid).
- Fares were defined by political authorities, sometimes without a complete calculation of costs and revenues.
- The public was not adequately educated about route changes. Communication failures occurred in Bogota; Santiago, Chile; Mexico City; and León, Mexico during expansion, leading to chaotic conditions and, in some cases, public protests.
- Existing transport operators protested when their interests were sidelined. For example, they were not involved in the BRT process through direct negotiations, or the bidding process failed to satisfy them.
- Fare collection systems were not integrated with public transit systems everywhere. Such disconnections occurred in Beijing, Bogota, and Mexico City. Even BRT corridors were not always integrated with one another. Examples include Jakarta and Quito.
- Bus scheduling sometimes led to overuse at peak hours and underuse at off-peak hours. Peak-hour crowding and off-peak inactivity are perhaps the most visible weaknesses in BRT operation. One or both can be seen in Beijing, Bogota, Curitiba, Guayaquil, Jakarta, León, Mexico City, and Quito.

Source: Hidalgo, Custodio, and Graftieaux 2007; ITDP 2007.



FIGURE 6.4

## Average daily bus rapid transit: Passenger counts are much higher in Lagos than in Johannesburg



Source: brtdata.org.

Note: Values for Africa do not include Dar es Salaam.

Different densities require different solutions. Mass transit needs high population densities, which make it more likely that the system will be used with sufficient frequency and that high capital investments will be justified. The appropriate transportation systems for a city varies with population and job densities throughout the city. Improving logistics and designing routes and bus stops might be enough to improve connectivity in places with low densities; higher density can require a BRT, a light-rail train, or a subway. A study of the United States by Guerra and Cervero (2011) finds that to be in the top quartile of cost-effective investments, a BRT system with a cost of about \$50 million per mile would need about 18 jobs and residents per acre within a half mile of the stations, a light-rail train would need 50 jobs and residents per acre, and a heavy-rail system would need about 60 per acre.

### *Integrated urban planning, regulation, and transportation investments*

As African cities grow larger, policy makers need to carefully plan the modes of transportation that will best enhance urban mobility. Chinese cities have seen massive sprawl and huge dependence on cars (box 6.2). They have grown through a mammoth

transformation of rural land into urban land and development of large-scale infrastructure. In contrast, Japan has limited the amount of rural land conversion and linked its spatial hierarchy of subcenters by the most developed subway network in the world. The result has been a vibrant urban economy and social integration.

Integrating urban planning and regulation with transport investments can help enhance ordered and efficient transport development, as it has in Curitiba, Brazil (figure 6.5b). Curitiba's 1965 master plan first envisioned the city structure. Today the city has created articulated densities along its BRT corridors, with buildings strategically built along BRT corridors. As a result, the city has lower greenhouse gas emission levels, less traffic congestion, and more livable urban spaces than similar cities in Brazil. Public transportation is also more widely used. For instance, although São Paulo has at least 10 times Curitiba's population, in 2000 the number of annual public transit trips per capita was higher in Curitiba (355 versus 330 in São Paulo) (Suzuki, Cervero, and Luchi 2013).



BOX 6.2

## Alternate paths for improving urban mobility: Lessons from China and Japan

### *China's cautionary tale: Avoid getting locked into the "large-scale" mindset*

In the early stages of urbanization, the massive and accelerated conversion of rural land into urban land brought in large amounts of capital, further fuelling the process. The resulting economic growth has led to large-scale industrialization and social transformation. China now suffers from severe urban sprawl based on giant infrastructure and isolated buildings, a marked contrast to the much finer grain of Chinese historical spatial forms. This new stage of development of Chinese cities has severed the traditional links between family generations and between neighborhoods. Spatial zoning and large-scale separation of activities has greatly increased mobility, imposed strict separations between economic classes, and increased the amount of time spent at work as opposed to leisure activities. The diversity of Chinese cities, with their different climates and cultures on a semi-continent, has been reduced to a uniform category of modern city, which consumes massive amounts of energy and will be locked into car dependency in the future. This urbanization model is not only environmentally unsustainable, it also jeopardizes the future of China's transition toward a more mature society that is less dependent on low-cost labor and more dependent on innovation-based economic growth.

China has built its intra- and interurban networks with a very large grain compared with other countries. The result has been a decline in the number of possible links and paths between urban elements in China compared with cities and city systems in Europe and the United States. This lack of medium- and small-scale street networks has a strong impact on the management of traffic flow. The system is inefficient; among the resulting problems is congestion at the level of thoroughfares and subway lines.

As a result, the deployment of a variety of transportation choices (walking, biking, buses with short distances between stops, tramways, dense subways, regional trains) is ruled out. People cannot efficiently time their commuting schedules daily. Everyone has only two choices: the large-scale mass transit system or the urban highway. The lack of short-range local choices and diversity creates strong

global inefficiency, because it obliges sizing the whole system for peaks that could be better dissipated by a variety of modal choices in a large "space of paths," fitting the distances to travel at a finer grain and creating a better-structured city organized around a variety of scales. Peaks cannot be dissipated into capillary networks, because the system lacks capillarity. To avoid congestion, the large scales are overdimensioned and segregated from the smaller scales, which prevents the emergence of intermediary and small scales connected to the large scale. This reinforces large scales against intermediary and small scales and eventually locks cities into "large-scale dependence."

### *Japan's successful organization, based on fine-grain and local connectivity*

Japan increased its rate of urbanization from 25 percent in 1950 to 65 percent in 1980, while rising, in 30 years of sustained growth from poverty after the destructiveness of World War II, to become the world's third-largest economy, after the United States and China. Japan developed the largest city in the world, Tokyo, with 38 million inhabitants, in a highly efficient way, through myriad micro-processes, creating a highly complex, well-integrated, and well-connected spatial hierarchy of subcenters, linked by the most developed subway network in the world. Rather than relying on excessive rural to urban land conversion and then suffering from the detrimental urban sprawl that resulted, Japan based its urban growth on internal intensification through well-balanced spatial planning policies and a balance between micro-processes and larger-scale structuring interventions.

By preserving and reinforcing fine-grain and local connectivity, Japan has avoided the destruction wrought by the collapse of the centuries-old social structure in China. Japanese society supports both social resilience and vibrant economic activity. By providing an appropriate framework for investment at the district, city, and national scales, Japan has produced well-balanced cities with high degrees of connectivity at the district, city, and national scales. Its numerous medium-scale projects and investments have avoided the large-scale dependence that China suffers from and contributed to the emergence of livable, low-carbon, and successful cities.

Source: World Bank 2016b.





FIGURE 6.5A

## Integrated urban planning and regulation promote density

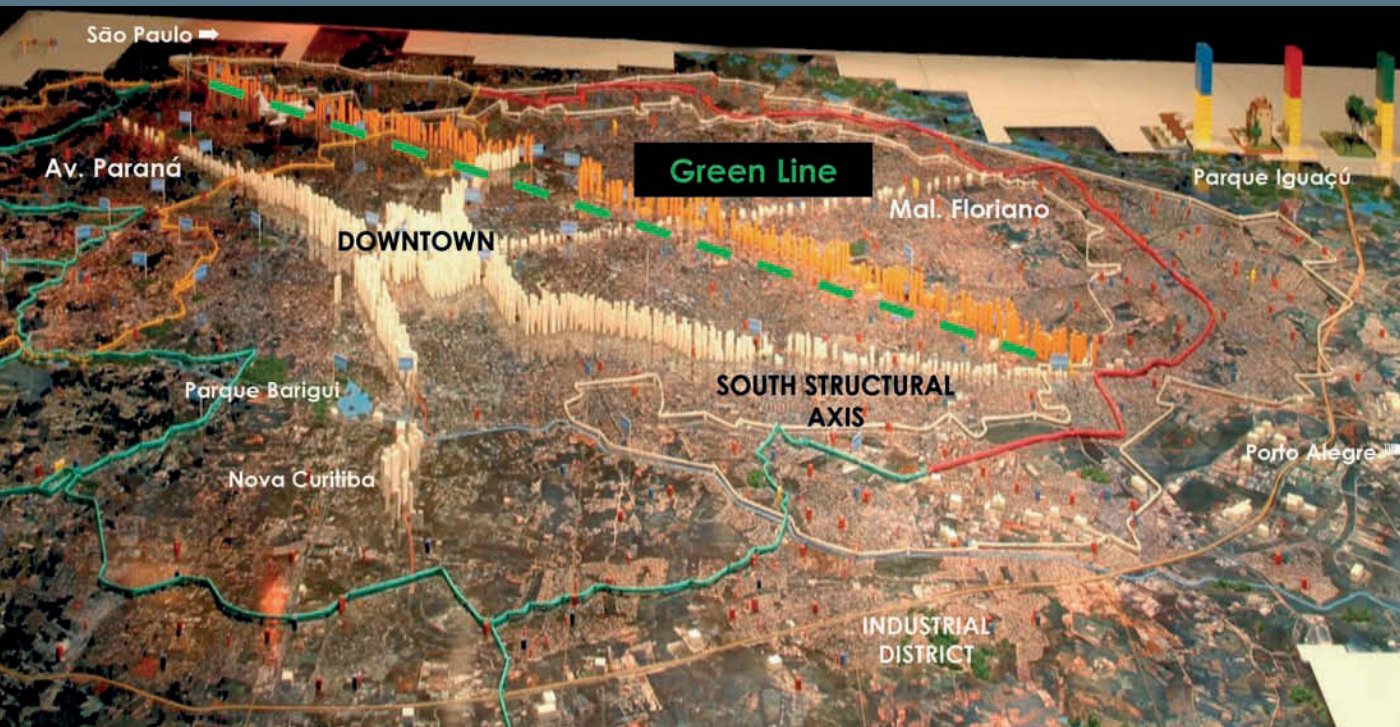
### *Bogota, Colombia*



Source: Suzuki Cervero, and Luchi 2013.

FIGURE 6.5B

## Integrated urban planning and regulation promote density

*Curitiba, Brazil*

Source: IPPUC 2008.

Note: The red, green, and orange lines indicate the city boundaries.

In contrast, transportation in many cities has been motivated by the unique objective of improving mobility. In these cases, the opportunity of promoting sustainable patterns of urban growth in the long run is lost. For instance, in Bogota, land use regulation has not been coordinated with TransMilenio corridors. The city maintains a low floor area ratio (0–2) throughout the city, except within the central business district and a few other selected spots (see figure 6.5a) (Suzuki, Cervero, and Luchi 2013). These cities lose the opportunity to achieve less fragmented, livable cities.

### *Roads, densification, and land use change in four East African cities*

As part of this research project, a study of roads in four East African cities — Addis Ababa, Dar es Salaam, Kigali, and Nairobi — examined the extent to which the timing and spatial incidence of public investment drives population densification and private investment in housing and industrial structures

(Folkner, Lall, and Lee 2016). The study used data from very high-resolution satellite images to measure road investment using remote-sensing classification methods at a very high spatial resolution. It then used econometric techniques that measure roads and urban structure over time — including differences-in-differences with propensity score matching — to estimate the quantitative associations between road investment, land use changes, economic productivity, and population density.

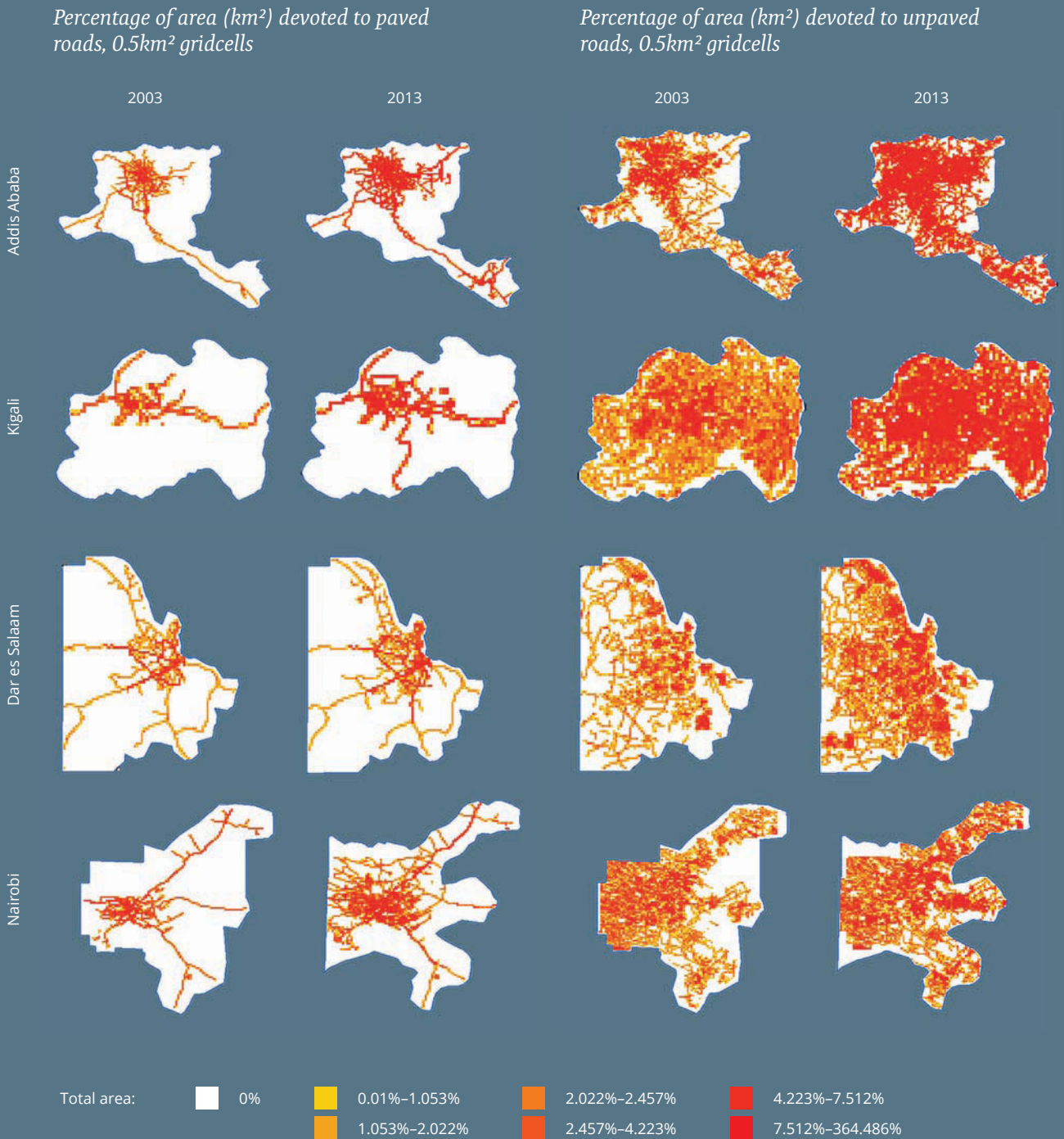
The results quantify the full extent of the road network in each city for five categories of roads: three-lane paved roads, two-lane paved roads, two-lane paved roads with paved service lanes, one-lane paved roads, and unpaved roads. Also quantified is the full extent of road investment and road changes over 2003–13 (figure 6.6). The spatial resolution of the data enabled the authors to identify precisely where road investment was made in each city for each type of road and to spatially quantify the level of that investment.





FIGURE 6.6

## Percentage of area devoted to paved and unpaved roads in four East African cities, 2001 and 2013



Note: Figures show percent of each square kilometer devoted to roads. Each grid cell is half a square kilometer. Source: Felkner, Lall, and Lee 2016.



African cities generally have low levels of road investment (chapter 2): In a representative sample of 30 global cities on the proportion of land area devoted to roads (UN Habitat 2013), Kigali ranked 19th, Addis Ababa 24th, and Nairobi 27th. Yet these four cities saw heavy road investment over 2003–13, measured in terms of total road length and total area devoted to roads. The area for roads increased 54 percent in Nairobi, doubled in Dar es Salaam, trebled in Kigali, and almost quintupled in Addis Ababa. Total road length almost doubled in Dar es Salaam (increasing by 98 percent, from 1,771 kilometers to 3,498 kilometers) and rose by 78 percent in Addis Ababa. It grew more modestly in Nairobi (23 percent) and Kigali (19 percent).

The study finds that paved road investment was positively and significantly associated with population density growth; growth in economic activity, as proxied by night light radiance; and industrial land use growth.

- Road investment and population density.** Paved road investment is associated with a 37 percent increase in population density for all cities pooled. It is associated with a 17 percent increase in Kigali and a 34.4 percent increase in Nairobi. Most of the estimated associations are strongest within 1–2 kilometers of the road investments. The bulk of the paved road investment impact appears to come from one-lane paved roads, less from two-lane paved roads with paved service lanes.
- Road investment and economic activity as proxied by night light radiance.** Paved road investment is associated with an increase in economic activity (as proxied by night light radiance) of 24 percent in Kigali and 13 percent in Nairobi. As with population density, the magnitude of the estimated coefficients tends to be highest within 1–2 kilometers of the locations of the investment. These results held across multiple robustness checks. (Results for Addis Ababa are questionable, because of likely errors in the city's night light data related to the linear interannual calibration process.)
- Road investment and industrial land use.** Paved road investment is associated with a 31 percent growth in industrial land use, a result that holds across robustness checks. Two- and three-lane paved road investments have stronger associations with industrial land use growth than one-lane paved roads. Paved road investment corresponded to a 74 percent increase in industrial land use in Addis Ababa, an 83 percent increase in Dar Es Salaam, and a 325.4 percent in Kigali. The results for Nairobi were negative and significant.
- Road investment and formal residential land use.** Results are inconclusive. When estimated for all cities pooled, paved road investment is associated with a significant decrease in formal residential land use growth. Results are negative for Dar es Salaam and Nairobi but positive for Kigali. The results are positive for Addis Ababa for unpaved roads.

### *Citywide economic benefits of road improvements in Kampala*

The research findings reported above show the spatially localized benefits of urban road improvements. There are also broader citywide economic benefits of transportation improvements. In recent research on road improvements in Kampala, Bernard, Bird, and Venables (2016) examine the potential benefits of improving the northern bypass around the city, aimed at improving connectivity between the west and east of the city (map 6.1) and upgrading the existing road network to facilitate movements within the city.

The direct beneficiaries of these improvements are workers using motorized transport, whose transportation costs decrease. Other residents also benefit, because lower transportation prices reduce the cost of living, at least in the short term, because over time, people relocate: The better-off locate farther from their jobs as commuting times decrease, reducing pressure on land close to the city center and allowing poorer people to settle close to their jobs. Low-skilled informal workers may actually benefit more than high-income workers, depending on the strength of agglomeration effects. If these effects are strong enough in the informal sector, as they were in Colombia (Duranton 2016), the relocation and increased clustering engendered by the transportation improvement will boost productivity in the nontradable sector (in which most low-skilled workers are employed). The resulting increase in wages in that sector might surpass the wage effect for high-skilled workers.





The long-term effect of the bypass on urban welfare is eight times its short-term impact; the long-term effect of upgrading the road network is three times as great. Transportation investments not only decrease the aggregate commuting time of users of motorized and nonmotorized transport, they also make easier for firms and households to relocate and have agglomeration effects on the city. If households and firms can relocate, both projects lower the cost of living by 19 percent for high-income households and 6 percent for low-skilled workers. With stronger scale economies in the informal sector and increasing returns to scale, the difference between low- and



MAP 6.1

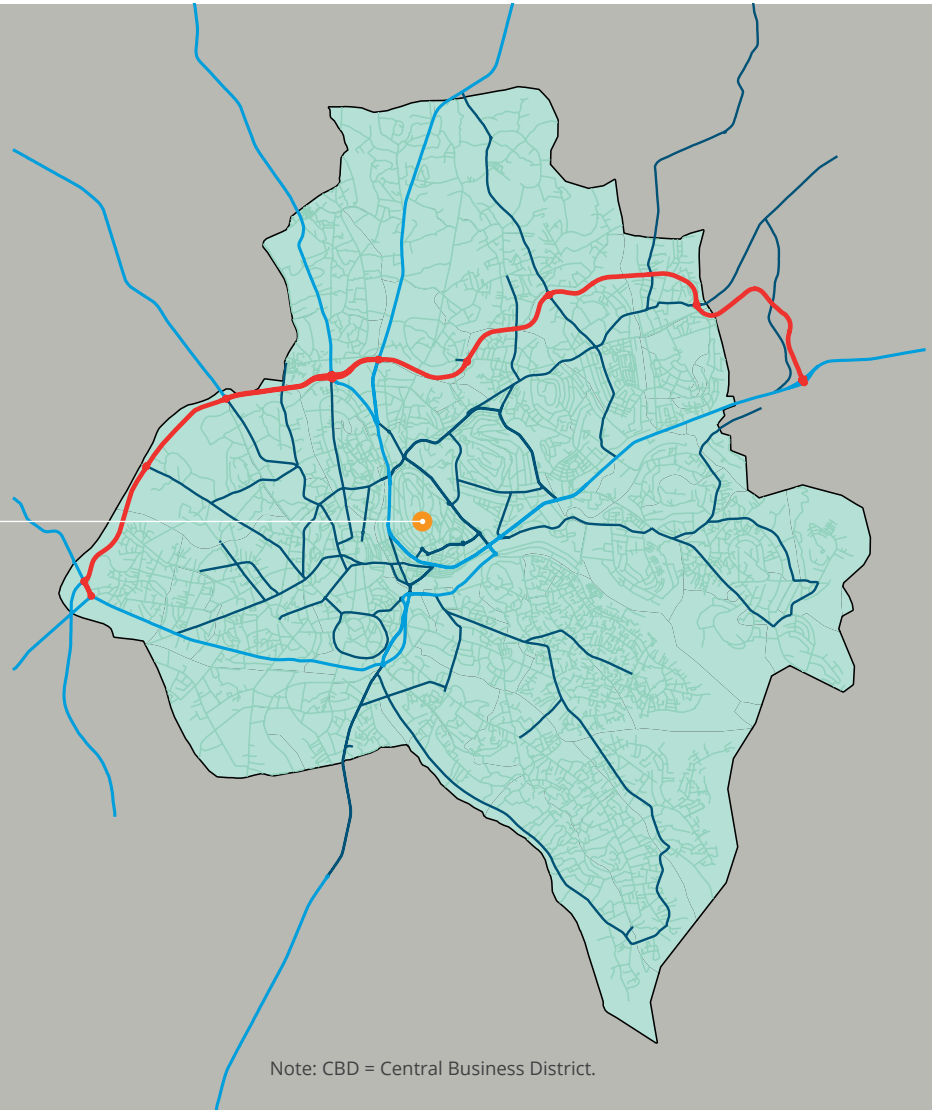
## The Kampala's Northern Bypass allows traffic to bypass Kampala's city center

CBD

-  Northern bypass
-  Primary road
-  Secondary road
-  Other roads and tracks

Source: Bernard, Bird, and Venables 2016.

Note: CBD = Central Business District.



high-skilled workers decreases, with a reduction in the cost of living of 3 percent and 9 percent, respectively. These investments' long-term effects on urban welfare are much higher than their short-term impacts: those from the construction of the bypass eight times, those from upgrading the road network, three times.

This research shows that the benefits of changes in the urban landscape, such as investment in transportation infrastructure, take time to emerge. Firms and households respond to these changes gradually. In the long term, planning policies should support relocation in response to change of connectivity for the full benefits of investments to be realized.

## Providing public goods and services for livability

Many African cities provide low access to public services and amenities. In expanding public services such as schooling, health, water, and sanitation, planners must consider that these services are subject to economies of scale and specialization. It is often less costly to provide a given level of per capita service

for a dense urban population than for a dispersed rural population (box 6.3; see also chapter 1). Being less costly, the optimal level of provision will likely be higher, so cities can provide better education, health, and other services than rural areas.



BOX 6.3

## Providing water to the poor in African cities

The experience of some African cities shows that access to safe water can be widely provided to the poorest households. A forthcoming World Bank report studies how five African cities — Dakar (Senegal), Durban (South Africa), Kampala (Uganda), Nyeri (Kenya), and Ouagadougou (Burkina Faso) — have provided reliable service to poor people in challenging environments (World Bank 2016). It concludes that these cities have improved access for the poor primarily through effectively managed utilities, which recover all operating costs and some capital costs while scoring well on other measures of efficiency and cost-effectiveness.

Five lessons emerge from the report:

- 1. Successful reforms need local leadership.** All reforms were started and implemented by local leaders. Outsiders assisted only with knowledge and financial support. The start of successful reforms displayed three mutually reinforcing conditions: (a) a catalytic event or space for reform, (b) a skilled technical leader motivated to improve service, and (c) a relatively stable political leader who supported and protected the reform. These conditions are inherent to a particular context and cannot be manufactured, created, or effectively driven by outsiders.
- 2. Utilities that serve the poor well** involve the community. In Durban, eThekweni Water established a consultative committee with low-income communities. The committee became engaged and supportive when the utility addressed requests to increase the free basic water allowance. The utility leader who drove eThekweni's turnaround

credits the continued renewal of his contract by the elected city council to eThekweni's success in serving poor communities. Uganda's National Water and Sewerage Commission noted that serving poor communities creates a powerful ally, saying "In Kampala, the poor vote." Its leadership reports that the "Water for All" campaign has won support from both poor communities and the government.

- 3. Independent structures are helpful but not sufficient for effective service provision.** Formal structures, such as independent boards and regulators, are not sufficient to ensure effective service provision, because they are not immune to predation or capture. However, these structures can be useful for bolstering professional corporate cultures and coordinating supportive relationships with external stakeholders. Affermage and related contracts in Senegal provide clear rules that are costly to change. Provided the utility keeps doing a good job, the contracts support success. The Office National de l'Eau et de l'Assainissement (ONEA) in Burkina Faso is publicly owned and operated. Its performance contract with the government is supervised by a multistakeholder committee comprising representatives of customers, NGOs, and the donors who finance the sector. The committee monitors performance of both the utility and the government under the contract on the basis of independently audited financial and technical reports. Such designs embed accountability to external stakeholders in formal structures that can also help mobilize support against predation.

Because the gains from enhanced urban service provision accrue to urban households, they offer an extra incentive for migration. As migration eventually leads rural and urban living standards to converge, the gain in well-being from urban public services will tend to moderate urban wages. Urban workers face some costs that are higher than for rural workers — such as housing and commuting — and so need higher wages to compensate for them (see chapter 3). Better urban services will counter these effects, helping the city break into markets for internationally traded goods.

Recent research shows that access to basic services increases steadily with population density (Gollin, Kirchberger, and Lagakos 2016; for differences in access to particular services.<sup>30</sup> Rural and urban are thus not binary but a continuum: Moving to more densely populated areas can improve one's living standards. Many obstacles could prevent a rural family from moving to a city; fewer would prevent households in a small town from moving to a larger one.



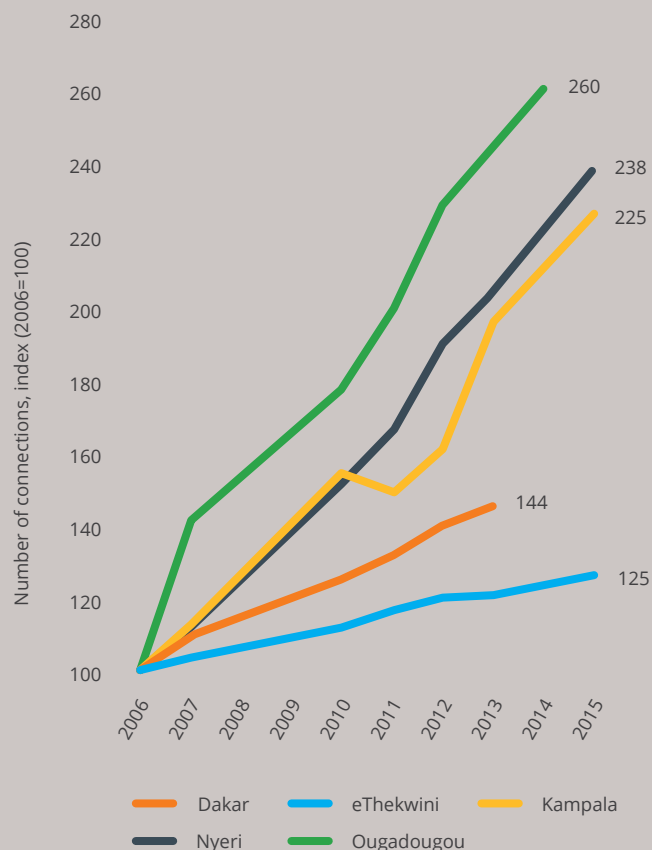


**4. Efficiency needs to improve — it's not just a matter of getting more outside financing.**

These turnarounds required hundreds of millions of dollars of investment in networks and production facilities. Between 2006 and 2015, the utilities serving the five case study cities increased the number of water connections by an average of 93 percent (box figure 6.3.1). They financed these improvements partly by improving their efficiency, so that they could increase their operating cash flows to raise and repay loans for infrastructure investment. Some borrow commercially, but most rely mainly on development bank lending, taking advantage of credit enhancement offered by their national governments.

**5. Different approaches are necessary to make access affordable for the poorest households.**

These cities implemented increasing block tariff structures and used cross-subsidies between commercial/industrial and residential customers to guarantee affordable access by the poorest households. Where informal land tenure does not allow service provision, or the pattern of settlement or topography makes conventional network designs infeasible, they improvised new technical and institutional arrangements, including working with small providers to deliver services where the utility is restricted by capacity or mandate (as in Ouagadougou). This option is proving handy for a wider range of utilities.



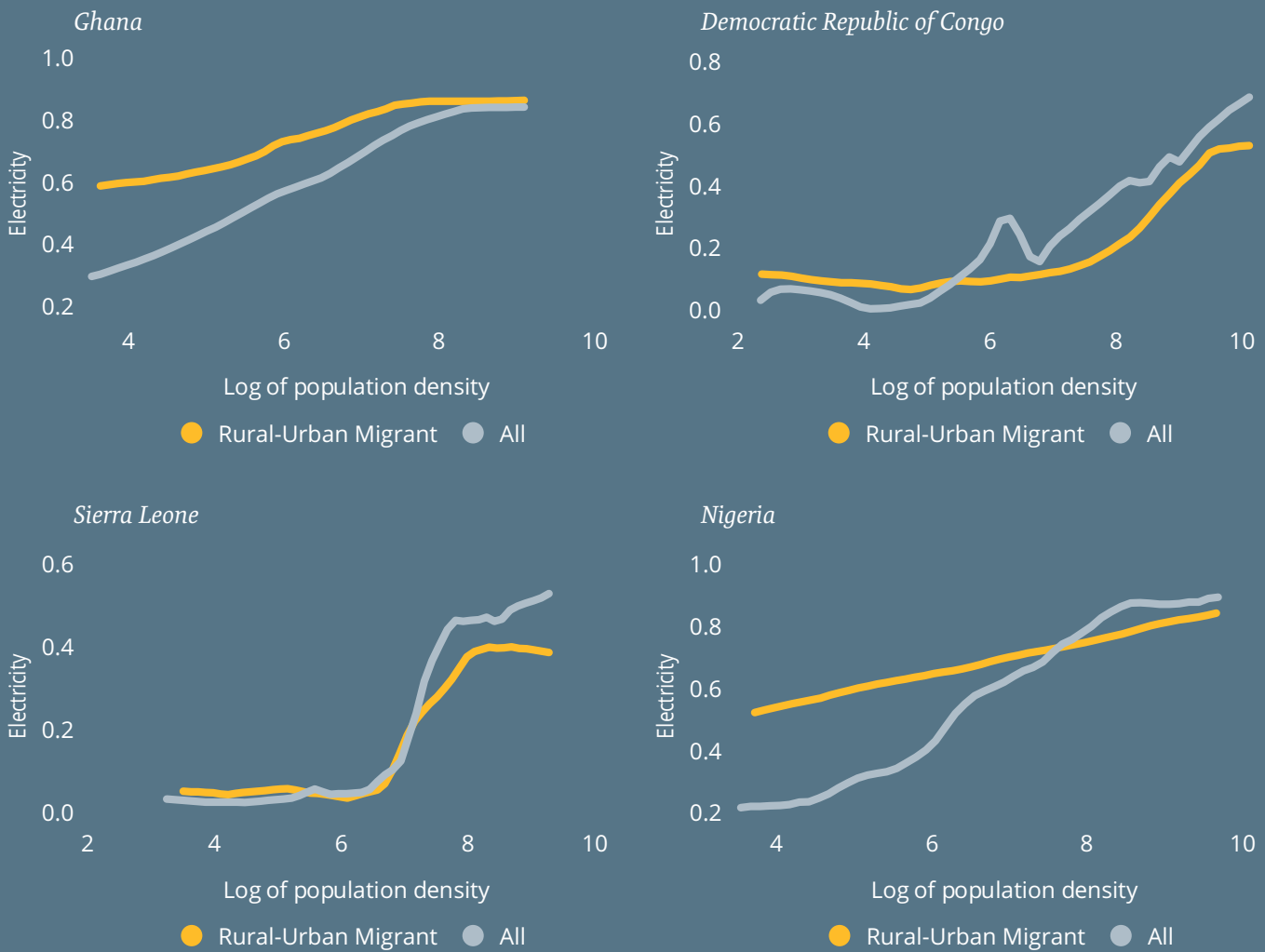
Source: World Bank 2016a.

Why has such migration from smaller to larger urban areas not been observed? It may be that too little information is available for a detailed study of migration in Africa; most data are on rural-to-urban migration. Other possible explanations include the fact that denser areas have a limited absorptive capacity; government policies are working to prevent slum proliferation; and migration is limited by unclear land titling, risk aversion, and poor information (Gollin, Kirchberger, and Lagakos 2016; De Brauw, Mueller, and Lee 2014).

Depending on the country and the service, migrants can be better off or worse off than other residents (figure 6.7). Differing urban management policies might explain these differences in access to services.

FIGURE 6.7

Access to electricity by newly arrived migrants and other residents in the Democratic Republic of Congo, Ghana, Nigeria, and Sierra Leone



Source: Gollin, Kirchberger, and Lagakos 2016.



## Financing lumpy urban infrastructure investments

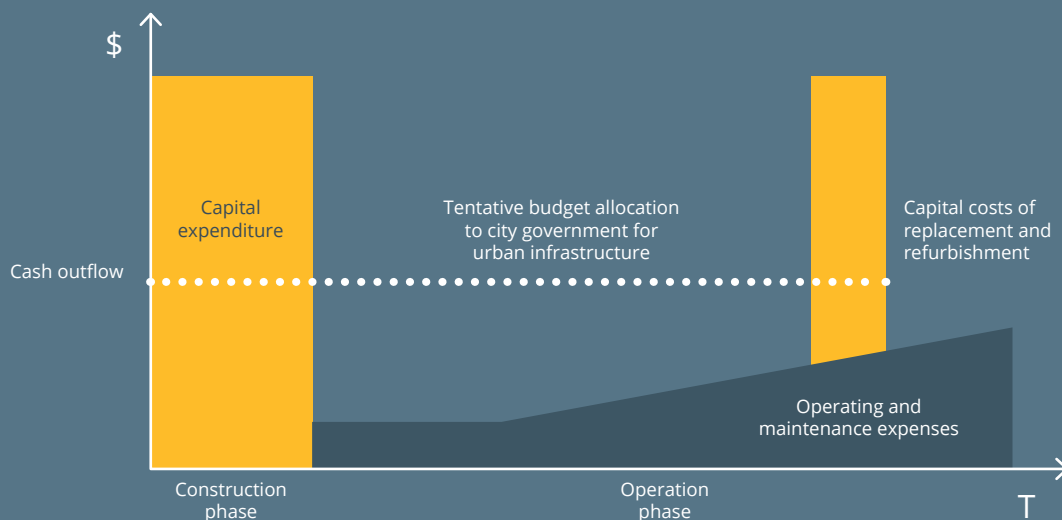
Public authorities should seize the opportunity of residential density to build highly productive infrastructure and public services. That effort will require building revenue systems to finance provision. The capital costs of public infrastructure must be incurred far in advance of the productivity and livability benefits. The large capital outlays required can be daunting. They are likely to far exceed the budget of any city government (figure 6.8).

Because cities with good connectivity generate large gains in productivity for their inhabitants, they offer many potential tax points. Transactions within the city could be subject to a sales tax, and households (or firms) could be made subject to a local income (or business) tax. But the least distorting form of taxation may be appreciation in urban land values. As the city becomes more productive, in order to benefit from the enhanced productivity that it enables, firms and households must locate to it. As this happens, the value of land parcels appreciates, usually with the level of connectivity. This appreciation capitalizes the additional productivity provided by locating on that parcel.

Land-based financing can thus be an attractive option for infrastructure investment. It takes different forms at different stages of a city's evolution (figure 6.9). Such financing has clear advantages in principle. First, if the infrastructure is worth providing, the appreciation in land values that it generates must exceed the cost of provision, most likely by a wide margin. Second, as the appreciation in land values is an economic rent rather than a payment to a factor of production — that is, it does not depend on the effort of the land or its owner — taxing that rent does not distort productive behavior. Appreciation does not require the tax point to be a land transaction, in which there is considerable scope for falsifying the transaction to evade taxes. An alternative is an annual tax based on a market estimate of the average value of land in the area.

FIGURE 6.8

### Gap between capital needs and budget resources of city governments



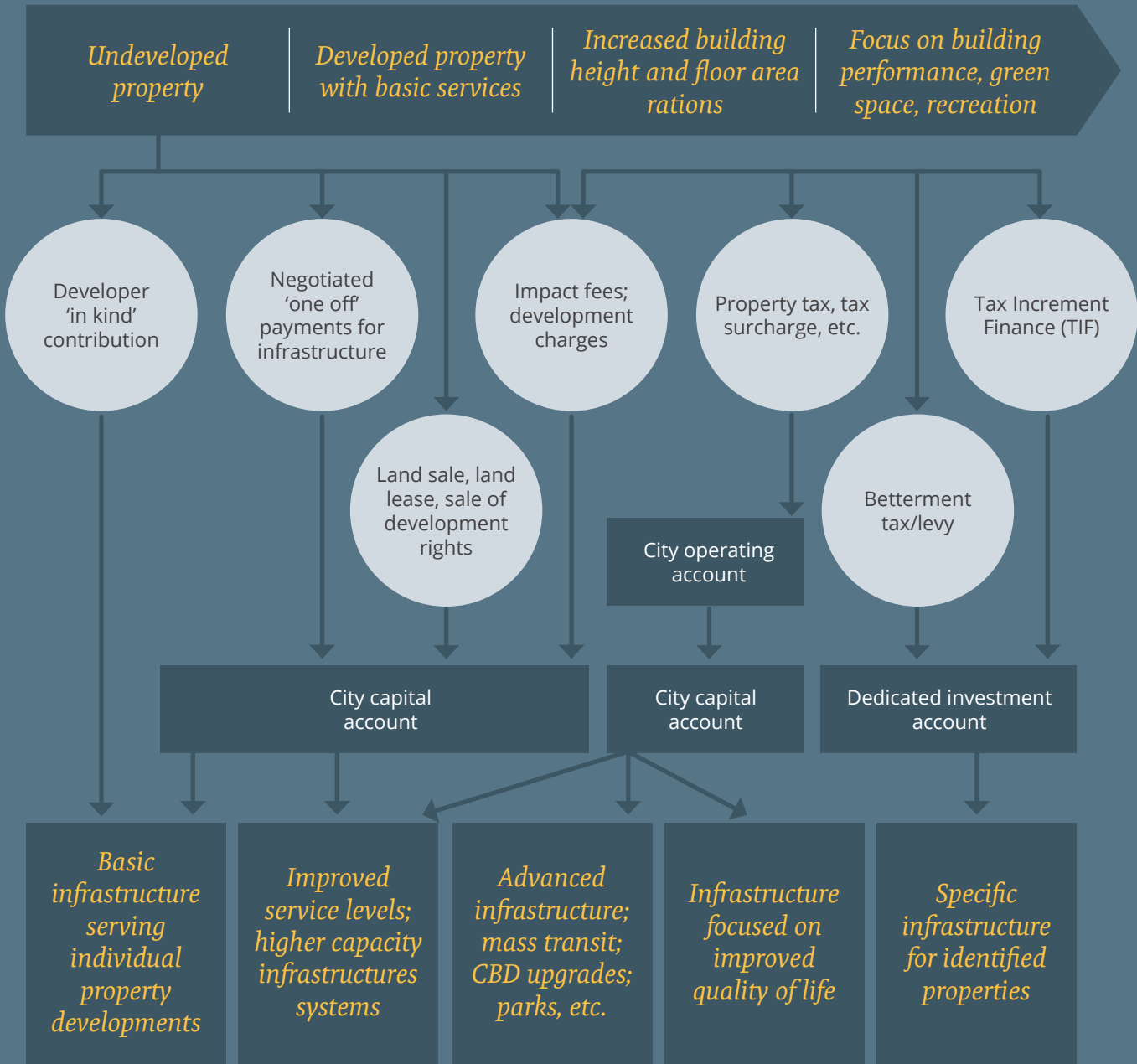
Source: KPMG 2011.



FIGURE 6.9

## Land-based financing instruments and city evolution

### Progressive evolution of cities



Source: African Centre for Cities 2015.

Note: CBD = Central Business District.



African cities are generally poorly positioned to finance their infrastructure needs through typical channels such as grants, transfers, own-source revenue, or borrowing. Land-based financing holds great potential to contribute to infrastructure financing — as long as some conditions are met:

- Demand for property.
- An effective supply of developable land, land rights, property finance, and a working real estate sector.
- A sound regulatory and policy framework, with good legal backing.
- The financial and technical capacity to implement and monitor land-based financing instruments.

Most African cities do not yet meet these preconditions; they should work toward meeting them, with the goal of leveraging land values to fund much needed infrastructure projects. A study of Ethiopia, Kenya, and Zimbabwe and a scan of 28 large property development projects in Africa finds only very little land-based financing (African Centre for Cities 2015). Of the three countries, Ethiopia has generated

the most significant volume through the land-lease system. Kenya and Zimbabwe have legislation in place but are underperforming or ineffective in ring-fencing the proceeds for infrastructure.

Where land-based financing instruments are in place in Africa, the modality is largely limited to in-kind contributions, such as installation by developers of the secondary infrastructure connections and, at times, bulk infrastructure required for particular projects. This infrastructure may not be optimally located or not well coordinated enough to form an integrated infrastructure network. These land-based financing instruments also tend to benefit middle- and high-income groups, who are the main consumers of such development projects. In many cases, the local government subsidizes them in an attempt to boost local economic development.

A better form of land-based financing may be the development charge, a one-off payment made by a developer when land use changes are approved or new developments begin. It is matched by a complementary policy and governance framework, as well as by implementation capacity.

If cities in Sub-Saharan Africa remain crowded, disconnected, and costly, they can be neither kind to their residents nor productive. These cities are still being built. Before it is too late, they can ensure that they are not locked into inefficient and unsustainable patterns of urbanization. Given the high sunk costs and enduring nature of infrastructure, any approach to urban development that lacks early planning and coordination will burden future generations with cleaning up the mess — a terribly inefficient strategy.

To inspire higher expectations, cities in Africa need better institutions. It is up to local and national authorities to undertake the institutional reforms needed for effective planning and coordination that will increase urban economic density and productivity and spur Africa's belated structural transformation. Institutional structures must lead, not lag, urban infrastructure. If they do, the region's cities will become not only better connected and more efficient but also kinder to their inhabitants, whose skills will be critical to economic growth and development. Only when this happens will the doors of African cities stand open to the world.

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