Financing Metropolitan Governments *in* Developing Countries

Edited by

Roy W. Bahl, Johannes F. Linn, and Deborah L. Wetzel

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SHAHID YUSUF

The world's population crossed the 7 billion people mark in 2011, more than half of whom make their homes in cities. Each week, the ranks of urban residents increase by 1 million, and on every single day some 20,000 new dwellings and 160 miles of road are added to the existing stock. China alone constructs 2 billion square meters of floor space each year, approximately half of the global total. Looking toward the middle of the century, demographers project a global population of close to 9 billion, barring unexpected changes in fertility trends and unforeseen calamities, and urbanists assume that 70 percent of this vast number will live in cities. More people and more cities are an inescapable part of the future. Should urban densities continue declining at about 2 percent per annum, as they have through much of the twentieth century, the built-up area will expand at a far faster rate than the urban population. By one estimate, the urban population in developing countries could double by 2030, whereas the built-up area encompassed by cities would triple. Clearly, future generations are in for exciting times.

Metropolitan Challenges

Research on urbanization since the 1960s shows that it closely correlates with industrialization and with rising incomes because of the higher productivity of average urban workers relative to their rural counterparts.[1] But too many cities in advanced and developing countries are failing to exploit the "urban advantage" and in fact are

I am greatly indebted to Lopamudra Chakraborti for assistance with the research for this paper. I owe a special thanks to the editors and the participants of the Brookings workshop for their many valuable comments and suggestions that have helped improve content and presentation.

[1] However, industry does not appear to cause urbanization in the sense proposed by Clive Granger (1969 as it arguably did from 1850 to 1960 (see Henderson 2010). Granger devised tests for determining whether one time series data could forecast another thereby demonstrating a measure of causality.

struggling to cope with the physical and financial pressures resulting from growing populations and the associated crowding, pollution, vehicular traffic, shortages of housing and services, increasing poverty and inequality, spread of slums, and environmental degradation.[2] Very few cities in developing countries are fortunate enough to steadily generate enough jobs for the growing workforce and to address endemic problems of unemployment. Where economic performance falters and/or revenue effort is weak, urban services suffer, which affects business activity and the quality of life, especially for the poor. With vehicle ownership mushrooming, cities confront an equally daunting task of financing, building, and maintaining needed infrastructure. Soaring automobility is exacerbating the problem of carbon and other emissions associated with urbanization. In fact, most cities have barely begun to tackle the physical and institutional changes required to contain greenhouse gasses and to engineer the resilience demanded by the threat of climatic extremes.[3]

For an expanding global economy, energy and resource scarcities will be mounting concerns requiring a change in urban design, in modes of transport, and in soft and hard infrastructures. And climatic change will expose cities to pressures and shocks rarely experienced before. Few cities will be spared, and many coastal and semiarid locations may continue to remain habitable only through major injections of capital.[4]

Inevitably, no infallible recipe or sufficient conditions will assure successful urban development. However, the collective experience of scores of urban centers, many of which have embarked upon innovative policies, strengthened their finances, and introduced new technologies, provides reliable pointers on creating a dynamic metropolitan region that would provide most inhabitants with jobs and a decent quality of life.[5]

Starting with the reasons underlying rapid urbanization in recent decades and its likely continuation through the first half of the century, this chapter first examines the rise of the metropolitan region and the advantages stemming from agglomeration. It then details the factors determining the pace and characteristics of urbanization, focusing on national policies, economic structure, financing issues, physical characteristics and infrastructure, the implications of "smartness," governance, and sustainability.

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[2] That too many cities in advanced and developing countries are failing to exploit the "urban advantage" is emphasized by the U.N. Human Settlements Programme (UN-HABITAT 2008). Inequality is greatest in African cities (Gini coefficients of 0.58), but it is rising most rapidly in Asia (UN-HABITAT 2008). Although the percentage of those living in urban slums is estimated to have declined from 39 percent to 32 percent from 2000 to 2010, the absolute numbers have risen. On current trends, there will be almost 900 million slum dwellers by 2020 (UN-HABITAT 2008). According to other estimates, up to 2 billion people will be living in informal settlements by 2030.

[3] Cities account for 80 percent of all greenhouse gas emissions, with the top 50 cities releasing 2.6 trillion tons of greenhouse gases per year (Oxford Analytica 2011). The topic of urban resilience has brought forth a considerable literature (see, e.g., International Council for Local Environmental Initiatives 2012; Newman, Beatley, and Boyer 2009; World Bank 2008).

[4] In a number of instances, these injections of capital will include expenditures on infrastructure to augment the water supply with the help of transfers from other parts of the country, as in China, and through desalination of seawater.

[5] An increasing number of innovations are targeting the vast army of low-income slum dwellers (see Smith 2011).

Urbanization: From Canter to Gallop

Five factors account for accelerating urbanization and its structural characteristics, and their persistence determines the dynamics, challenges, and policy implications of urbanization discussed throughout this chapter.

First, the demographic transition caused by a sharp decline in infant mortality, increasing life expectancies, and a much more gradual reduction in fertility has resulted in ballooning populations in developing nations. This increase in population has caused cities to grow and has also led to in situ urbanization with small towns and villages mushrooming into cities in China (see Zhu et al. 2009), Pakistan, and Brazil, for example, with Brazil having achieved European rates of urbanization by 2000.[6] Greater rural population densities have pushed people to migrate, and higher incomes and greater amenities in cities have exerted a parallel pull.[7] With population pressures rising, cities are seen as beacons of opportunity as economic prospects are diminishing in rural areas. Urbanization is correlated with rising living standards, even as the transfer of populations has led to increased poverty in cities (Ravallion 2007). The share of the population in urban areas living on the equivalent of less than a dollar a day rose from 19 percent to 24 percent from 1993 to 2002; over the same period, the urban share of the population as a whole rose from 38 percent to 42 percent. The urbanization of poverty was most rapid in Latin America, with a rise in proportion of the poor living in urban areas from 50 percent in 1993 to 60 percent in 2002. By contrast, less than 10 percent of East Asia's poor live in urban areas, largely because absolute poverty in China is overwhelmingly rural.

Second, agricultural production is becoming less labor intensive, with machinery, chemicals, and energy serving as substitutes.[8] Fewer hands are needed on farms, and if the impressively productive agricultural systems in advanced economies are harbingers of what developing economies can expect, the share of the agricultural labor force in low- and middle-income countries will drop from an average of about 25 percent of the national total in 2007 to less than 10 percent. Furthermore, dispersed small-scale rural industry, which tends to be inefficient and polluting, is fighting a losing battle with urban producers, which enjoy manifold advantages compounded by declining costs of surface transport and increasing efficiencies in distribution and marketing technologies.

Third, technological advances and the evolving income elasticity of demand are responsible for structural changes that have enlarged the role of services. A stream of innovations have raised the productivity of manufacturing, contributing to growth but also resulting in declining relative prices of manufactures and reduced employment in industry, which explains why the share of manufacturing has fallen from 1980 to 2008. Thus, the share of manufacturing is a shrinking proportion of gross domestic product (GDP) in the larger cities, although it remains high for some smaller cities with industrial specializations. Meanwhile, rising demand for urban services and much slower gains in productivity have increased the share of

[6] Brazil's urban population rose from 36 percent in 1950 to 75 percent in 1990. http://www.citymayors.com/statistics/urban-population-intro.html; and World Bank, World Development Indicators 2011.

[7] This income gradient is the so-called Harris-Todaro effect of higher urban incomes (see Fields 2007).

[8] On the energy (and nitrogen fertilizer) intensity of modern agriculture, see Smil (2008; 2011).

urban services in GDP and employment. With the exception of China, services now dominate GDP everywhere, and in most cities in advanced countries, services provide the majority of jobs and generate more than half of the income.[9] In fact, with industry pushed to the margins of some urban economies, services are the economy. A fraction of services are tradable, but the bulk of urban services in developing countries are nontradable, and services comprise a small share of the exports of low- and middle-income countries, tourism being the largest contributor.[10] This has long-term implications for the number and type of jobs the urban economy is likely to create, for growth, and for exports to balance the city's trade accounts, because to be viable over the longer term, cities, much like countries, must have something to sell, with any shortfall being offset through capital transfers. Until a few decades ago, all growing cities were industrial cities with export potential. This has ceased to be the rule with the rise of services, both formal and informal.[11]

Fourth, cities enable firms to specialize and realize scale advantages. These so-called localization economies are an important asset for midsize industrial cities and a source of productivity gains from labor markets, technological spillovers, and the benefits of clustering of other producers and suppliers of services. For larger urban centers, urbanization economies are more prominent. These are the economies arising from the multiplicity of industry and services that open the door to diversification and induce the entry of new firms. Together, these lead to significant productivity gains and higher average incomes. Currid (2007, 460) notes that "agglomeration may be even more important to maintaining the social mechanisms by which the cultural economy sustains itself [through nonmarket transactions]." A vast literature, mostly on cities in developed countries, has attempted to estimate the gains from agglomeration, whether from localization or urbanization or from scale economies (Gill and Goh 2009; Glaeser and Gottleib 2009; Rosenthal and Strange 2004; World Bank 2009).[12] Researchers differ on which type of agglomeration matters more; however, all agree that agglomeration pays, although how much productivity can be traced to size and diversity varies from 3 percent to 12 percent.[13] A meta-analysis of elasticities drawn from 34 studies cautions that the gains from largeness should not be exaggerated (see Melo, Graham, and Noland 2009), but little or no evidence indicates that growth is disadvantageous for cities. However, casual empiricism suggests that as cities grow larger and more complex, management and service provision become difficult and congestion, pollution, and crime diminish the quality of life, as, for instance, in Bangalore (Bengaluru), São Paulo,

[9] From 1977 to 2007, the share of services in global GDP rose from 55 percent to 70 percent, and to 75 percent in Organisation for Economic Co-operation and Development member countries (Francois and Hoekman 2010).

[10] See Eichengreen and Gupta (2009; 2011) on the role of services with reference to India, Ghani (2010) on how growth in India could continue to be propelled by services, and Spence and Hlatshwayo (2011) on the contribution of nontradable services to the bulk of the employment created in the United States since 1990.

[11] In 2007, the global value of cross-border trade in services amounted to $3.3 trillion, or about a fifth of total trade. However, the share is closer to 50 percent when measured by value added, both direct and indirect (Francois and Hoekman 2010). The growth of cross-border trade is impeded by regulatory restrictions and by the greater protection accorded to services.

[12] Physicist Geoffrey West compares large cites to big animals whose size is a source of scale economies; when a city doubles in size, the resources required to sustain it grow by 85 percent (see Lehrer 2010).

[13] Rosenthal and Strange (2004) note that a doubling of city size can lead to an increase in productivity of 3–8 percent.

Lagos, Karachi, and many booming Chinese cities in the Pearl River Delta. Whether these collectively erode the productivity-enhancing advantages of size is debatable.[14]

The fifth and final factor contributing to the vigor of urbanization is the role of cities in sparking ideas, stimulating social change by inculcating new values, and encouraging innovation in every sphere of life. Johnson (2010, 16, 162) compares cities in all their variegated complexity to coral reefs "powerfully suited to the creation, diffusion and adoption of good ideas. . . . [T]hey cultivate specialized skills and interests, and they create a liquid network where information can leak out of those subcultures and influence their neighbors in surprising ways. This is one reason for superlinear scaling in urban creativity."[15] Such innovation has buoyed productivity; equally, it has enhanced human capabilities and raised the quality of life. Looking ahead, as cities in developing countries attempt to come to grips with increasing size, complexity, and pressures arising from climate change, their innovative potential will become ever more important and the basis not just of survival but also of prosperity.[16]

While continued urbanization appears to be a given, urban development is likely to evolve in different directions, with implications for growth and quality of life. From the perspective of this volume, the interesting issues pertain to the potential of the metropolitan model of urban development and how creatively metropolitan centers address the many different challenges they will face.

The Metropolitan Powerhouse

Megacities, with populations of 10 million and more, have increased in number from 9 in 1985 to 23 in 2010, and they account for almost half of the world's wealth.[17] Moreover, some of the megacities in East Asia and South Asia account for a third or more of the national GDP. A striking characteristic of the urbanizing tendencies in the United States, Latin America, and East Asia is the emergence of metropolitan regions or metropolitan corridors composed of a cluster of cities, which may or may not include a megacity. Seoul, Jogjakarta, São Paulo, and Bangkok are examples of metropolitan economies with a core primate city that has brought (or created) a number of dormitory, secondary, and edge cities into its orbit. The Pearl River Delta comprises another vast metropolitan corridor extending from Hong Kong to Guangzhou that arose with great rapidity once China adopted the Open Door Policy in 1979 and industry began transferring from Hong Kong.[18] A metropolitan

[14] Inskeep (2011) vividly describes the combustible nature of life in Karachi. Cohen (2004) presents some data underlining the unstoppable increase in average city size over the past two centuries: the largest 100 cities in the world had an average population of 200,000 in 1800, which rose to 5 million by 1990. Beijing was the only city with 1 million inhabitants at the beginning of the nineteenth century; 100 years later only 16 cities were of this size, but by 1950 their numbers had swelled to 86.

[15] *Superlinear scaling* refers to a faster than exponential rate of increase. Thus, as cities grow, according to physicist Geoffrey West and his coworkers at the Santa Fe Institute, such superlinearity is evident in telecommunication traffic, patenting, and pedestrian speed (see Andris et al. 2009).

[16] How cities can induce innovation is compactly summarized in Atkinson (2012).

[17] The 2010 U.N. State of the World Cities report (UN-HABITAT 2008) points to the emergence of the megaregion: an endless city. However, the bulk of the urban population resides in midsize and small cities.

[18] See McGee et al. (2007) on the rise of the Hong Kong–Guangzhou region and Berger and Lester (1997) on the transfer of industry from Hong Kong to emerging cities in the Pearl River Delta.

corridor is also taking shape in Pakistan, connecting the cities of Lahore and Rawalpindi. There are a number of reasons that the metro region might be the form that urbanization will take in the future, with isolated cities becoming an endangered species.[19]

The need to economize on energy use and on the cost of providing urban infrastructure makes the compactly designed metropolitan model a more viable proposition than the relatively isolated city that lacks the connectedness to a multiplicity of other conurbations (Glaeser 2011). The metropolis can also internalize urbanization and localization economies by combining a portfolio of cities in a single urban domain. The core city, with diverse services and advanced emerging industries that draw oxygen from proximity to centers of research, can be the primary source of urbanization economies (or Jacobs economies), while smaller peripheral specialized cities can serve as sites for industrial activities requiring cheaper land for factories and lower-rent accommodation for workers.[20] By yoking these different kinds of cities together with an efficient multimodal transport system that tempers the reliance on private cars, the metropolitan region can maximize the gains from agglomeration and market size economies. By expanding in the vertical plane, it can also squeeze many more people into a place with proven locational advantages, for example, a coastal or riverine plain location amply supplied with potable water, and capitalize on an existing foundational infrastructure and possibly a brand name.

A broad economic base and a large urban market make it easier for a metropolitan region to meet its financing needs and minimize fluctuations in revenue streams while keeping tax rates at moderate and competitive levels. Revenue adequacy underwrites industrial capabilities and provides the means for a city to adapt and change as circumstances change, calling for displacing of older industries by newer ones and a renewal of infrastructure and buildings so as to incorporate the latest technologies and accommodate changing lifestyles.[21] No metropolitan region ever optimizes on all these fronts, and when there are many adjacent municipal jurisdictions, coordinating infrastructure development, revenue-raising arrangements, and financial burden sharing can be severely challenging. By failing to arrive at coherent and mutually advantageous outcomes through negotiated give-and-take, multijurisdictional metropolitan entities are squandering the benefits of agglomeration, both economic and financial.

Building the Metropolitan Engine

Size and agglomeration economies can influence urban fortunes through productivity, but there are too many examples of metropolitan regions that are not

[19] Eventually, some of these isolated cities will either shrink drastically or end up as ghost towns once younger people migrate, revenues decline, services atrophy, and infrastructures deteriorate.

[20] Jacobs (1970) emphasized the advantages of innovation and stimulation of new activity that cities derive from diverse industries, hence the term *Jacobs economies*, which larger cities are more likely to benefit from than are smaller cities with a narrower base of activities.

[21] An example of recent technologies is the incorporation of information and communication technologies and new green technologies, which enable buildings to economize on water and energy. Smaller household size, increasing numbers of older people, and the explosion in relational networking are among the factors influencing lifestyles and demands on urban infrastructures and services.

realizing their potential. In some megacities the development of industry and tradable services is creeping along or in retreat, growth is stagnating, unemployment is widespread, and the supply of housing and public services is struggling to keep up with the demand because the productive economic base and revenue effort are both weak. Karachi, São Paulo, Cairo, Manila, and Johannesburg belong to this category of cities that are deriving few advantages from size and suffer instead from the diseconomies of unbridled agglomeration and sprawl. What differentiates these cities from metropolitan regions that are dynamic economically and registering high growth rates? For low- and middle-income countries, with lagging urban development in the face of rising urbanization, the missing ingredient is exploding business activity represented by the entry and growth of firms producing tradables (either manufactured products or services), creating good jobs, generating exports, and serving as a channel for new technologies absorbed from overseas and supplemented by their own adaptation and innovation.[22] Shenzhen, Bangkok, and Bangalore owe their dynamism to the continual value-adding and growth-enhancing churning of the business scene, with new (domestic and foreign) firms serving as a conveyor belt for investment and technology and competitive pressures sharpened by exposure to global markets, continually weeding out the laggards.

Entry of firms and growth of the most entrepreneurial ones are the lifeblood of the metropolitan region.[23] The dynamic cities not only benefit from high rates of entry but also, as in Beijing or Dongguan, encourage the formation of clusters that give rise to technological spillovers, stimulate productivity, and create conditions conducive to the formation of new firms.[24] Entry, cluster formation, and growth of the more productive firms can promote exports that in turn further stimulate economic expansion.[25] In fact, urban industrialization in the current context, and for all but the largest countries, is inseparable from participation in the international market.[26] This broadens market opportunities for the venturesome firms—a minority everywhere, but an important one—and spurs productivity and growth. Firms with the greatest managerial, organizational, and technical capabilities grow, and in both East Asia and Latin America, participation in international value chains has provided firms with technology and growth ladders. The Taiwanese experience, in particular, highlights this process of urban industrialization through a proliferation of small and midsize enterprises, their entry into trade, their proactive technology absorption and reverse engineering aided by public research institutes,

[22] All those who pour into cities are looking for "good jobs," if not for themselves then for their children (Banerjee and Duflo 2011).

[23] Firms develop and test their competitiveness by selling in the domestic market, frequently sheltered by tariffs, transport costs, local regulations, cultural predispositions of consumers, and complexities of marketing and logistics that foreign firms have difficulty mastering. Lenovo, the Chinese personal computer manufacturer, and Haier, the producer of white goods, have established and maintained a lead in the domestic market by catering more effectively to local preferences and effectively using domestic marketing channels.

[24] See McGee et al. (2007) on the globally oriented industrialization of Dongguan and Yusuf, Nabeshima, and Yamashita (2008) on the international experience with clusters.

[25] Larger, capital-intensive, and productive firms are more likely to venture into the export market (see Bernard et al. 2007). On the relationship between trade and growth, see the survey by Lopez (2005).

[26] Some evidence suggests that successful small and midsize businesses begin orienting toward global markets from the very outset (see Lloyd-Reason and Sear 2007).

and their emergence as globally competitive entities that drive the economies of Taiwan's cities and the national growth rate.

Once urban development takes off, the large metropolitan region has several advantages that can help to both build and sustain momentum. The medium-size peripheral cities are likely to be a fast-growing worldwide trend, with a large, youthful population that can provide entrepreneurial dividends and with lower-priced land to encourage new starts, especially in manufacturing. The core city, with a concentration of services and unskilled workers, offers a different range of opportunities, with many more niches for new startups and easier access to financing for existing firms or clusters of firms and for small and midsize enterprises.[27] The core city is better supplied with business development services, which can be valuable for new starts. The core city is also the focus of academic and cultural activities. Together, the concentration of universities, research and consulting services, and recreational facilities provides opportunities for knowledge workers with diverse skills to exchange and breed new ideas, some of which are enriched by combining two or more disciplines.

The metropolitan region, combining the advantages of midsize and large cities, has strong economic potential; however, its full development is realized when certain other criteria are met, in whole or in part:

- National policies.
- Industrial composition and clustering.
- Financing of urban development.
- Smart urbanization and governance.
- Connectedness.
- Sustainability.

These criteria or attributes were not uppermost in the minds of national policy makers when metropolitan cities were taking shape in the twentieth century. At the time, the financing of infrastructure and services was viewed as largely being the responsibility of the state; fuel was cheap; land for development seemed abundant; pollution and population pressures were less obtrusive; and sprawling low-rise cities seemed appropriate for the foreseeable modes of economic activity and lifestyles. Few, if any, city authorities and their allies among the developer communities seriously considered adopting a holistic long-term approach, which is warranted from the vantage point of current knowledge. But looking ahead, to succeed in attracting resources and talent and to maintain adequate growth rates, metropolitan cities, which have acquired more autonomy, will need to monitor progress with reference to the above, moving further along some axes than others, depending upon circumstances, without neglecting any one of them. Moreover, metropolitan cities will need to mobilize their political capital and to play a more active role in shaping national policies, something that cities such as Karachi have not done.

[27] Much depends upon the availability of affordable accommodations for small firms and their employees. In cities such as New York, London, and Paris and the cities in Silicon Valley, such space is becoming hard to find, which is squeezing out the most dynamic elements of the urban economy.

Wealth of Cities Derives from National Policies

If cities are truly the drivers of economic growth, how closely is that performance keyed to the national policy and overall national economic conditions? In other words, can cities forge ahead by dint of good urban policies more or less independent of events at the national level? Singapore surely fits this description, being a city-state, but other cities, even the largest and most prosperous, such as Tokyo, Seoul, São Paulo, Bangkok, Hong Kong–Guangzhou, and Shanghai, depend upon the enabling matrix of national-level trade, investment (domestic and foreign), fiscal, education, innovation, and other policies to provide the springboard for their own development.[28]

Even though decentralization and localization have transferred more administrative and fiscal discretion and policy initiative to subnational governments, and even though cities are at the leading edge of development, fundamental national policies define policy parameters, incentives, and the degrees of freedom available to city managers and, crucially, determine the fiscal and financial resources they can mobilize. The industrialization of Seoul and Shanghai was enabled by planning and day-to-day decision making conducted by city authorities and by a host of local regulations, rules, standards, and licensing requirements, but the opportunities for the cities were delineated and circumscribed by the investment, exchange rate, trade, industrial, labor, education, and technology policies of the central government. Both cities successfully groomed highly competitive export industries, which generated economic momentum and employment and catalyzed the development of other sectors of the urban economy. In particular, export-oriented industrial growth was paced by the expansion of transport and energy infrastructures financed partly through central government budget allocations and partly through loans from state owned (or controlled) banks.

From the mid-1990s, Seoul took a lead in establishing a world-class infrastructure to harness the potential of information and communication technologies (ICT), with Shanghai now close behind. Weak leadership and an incoherent national policy environment have hobbled cities in South Asia, Latin America, and Africa, a malaise now spreading to "developed" countries. In East Asia, these measures initiated the process of modernization and integration with the global economy. The end result as of 2012 is two metropolitan economies that rank among the most vibrant in the world.

However, in both instances (and these examples can be multiplied), urban outcomes were prompted and shaped by national policies. The Korean government, once it embraced export-oriented industrialization, viewed Seoul as the engine of the economy, and urban development complemented other policies, more recently, policies to develop an ICT-supported knowledge and cultural economy.[29] It is the

[28] Foreign direct investment is an important source of capital and technology transfer for industrializing countries and is likely to remain a vital conduit. Singapore was the leading urban recipient of foreign direct investment projects in 2009, followed by Shanghai, London, and Dubai. In Latin America, São Paulo, Bogotá, and Mexico City led the field. See FDI Intelligence (2011).

[29] Even though the Korean government was painfully aware of Seoul's vulnerability to an attack from the north, given that it was just 30 miles from the demilitarized zone, it acknowledged and exploited the city's strategic location and long-standing role in the national economy.

industrialization of the Seoul metro region that propelled the Korean economy during the high-growth era starting in the mid-1960s and continues to do so as Korea enters a postindustrial stage. Seoul has served not only as the seat of government and the nation's cultural hub but also as home to several of Korea's leading export industries, including textiles, machinery, electronics, and now the creative industries.[30]

Once China set its sights on reform and catching up with the leading East Asian economies and designated Shanghai as the head of the Dragon because of its location at the mouth of the Yangtze delta and its role in leading the economy of the Yangtze region, the city authorities had the green light to pursue an ambitious urban industrial strategy, which was amply supported by the central government and banks, as in the case of Seoul, and supplemented by the leasing of land to developers and by foreign direct investment induced through central policies reinforced by municipal incentives.[31] Shanghai's development since the early 1990s is the stuff of legend, and it owes much to the vision and energy of a succession of local officials, but it was the central government that loosened the rules binding Shanghai, encouraged the local authorities to raise their sights, and created the policy environment that allowed the city to more fully exploit its resource base, harness its vast latent capabilities, and bid for capital from elsewhere in China and from abroad.[32]

It is the central government that sets the stage and, to a greater or lesser extent, through policies and other interventions, choreographs urban development, in either positive or negative directions. Where central governments are missing in action, passive, or obstructive and predatory, urbanization may continue as it has in sub-Saharan Africa and in South Asia, but the urban economic, infrastructural, and institutional development that results in growth, exports, and jobs may be slow to materialize, if at all. Some cities in Africa, such as Kinshasa and Dar es Salaam, have become more populous during the 2000s but have not developed. Urbanization in Zimbabwe and the Congo is the direct outcome of conflict and worsening conditions in rural areas. Development has gone into reverse because the states have faltered or are failing (see World Bank 2011). Thus, the policy-making and administrative capabilities of the state and its urban strategy broadly define the opportunities for urban development. Some cities, especially capitals, are favored over others, and they have a head start; however, with the rules of the game as points of reference, it is up to the municipal authorities and other stakeholders to derive maximum mileage from the urban assets at their disposal, to enhance competitive advantage in profitable directions, to augment the local resource base, and to encourage investment that can maximize long-run growth.

[30] The creative industries include online video games, multimedia, moviemaking, and publishing (see Organisation for Economic Co-operation and Development 2005; World Bank 2008; Yusuf and Nabeshima 2006).

[31] Its past history made Shanghai a logical choice as a principal Dragonhead (see Yusuf and Nabeshima 2006; 2010; Yusuf and Wu 1997).

[32] Some of the mayors who contributed to Shanghai's resurgence were Wang Daohan (mayor 1981–1985); his protégé and successor, Jiang Zemin (1985–1989, later party chief and president of China); and Zhu Rongji (1989–1991).

The Matrix of Industry and Services

It is appropriate to start with industrial composition because this is of immediate relevance for growth, employment, and exports, and the current mix foreshadows future options for a metropolis. The competitiveness of activities dominating the metropolitan economy determines growth prospects through sales in domestic and foreign markets and the gains to be derived from productivity through innovation or technological catch-up. Industrial composition also points to employment elasticities and the types of skills likely to be in demand. When firms cluster in ways that promote spillovers, the productivity bonus can be larger. The information technology (IT)–enabled service sector in Bangalore and in Gurgaon, the second largest city in the state of Haryana, located about 30 km south of New Delhi, are clusters of proven competitiveness and export success employing highly skilled workers and diversifying into more complex services offering larger rewards.[33] IT and similar industries, with good long-term potential and significant local linkages, are assets for the metropolis, not least because they have low entry barriers, which encourages the proliferation of businesses in societies where demonstration effects can uncork pent-up entrepreneurial energies.

Dongguan, one of the fastest-growing metro cities in China, is the center of manufacturing, covering a spectrum ranging from textiles to electronics.[34] These industries provide jobs to skilled and unskilled workers, and the diversity is fertile soil for new businesses. Manufacturing activities in Dongguan target foreign markets, and major multinational corporations (MNCs) such as Foxconn and Nike have located their main manufacturing assets in the city. This further enriches the industrial ecology of the city because large factories owned by MNCs exploit scale economies and buy inputs from or subcontract with thousands of specialized suppliers.[35] The MNCs nourish the ecosystem with capital and production technologies and boost the development of local research, standard setting, and testing facilities.[36] No less important from the productivity angle are the managerial, design, and marketing techniques and the multifaceted, incremental innovations that the MNCs introduce. That manufacturing productivity is increasing by 10 percent or more in cities such as Dongguan testifies to the speed at which technologies are being disseminated, and this helps to absorb rising wages while maintaining healthy profit margins.[37]

Bangkok is yet another example of a dynamic industrial metropolis. The core city is richly supplied with services, and around it have sprung several secondary cities crowded with manufacturing firms that rely on the providers of IT, finance,

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[33] See Heitzman (2004) on the development of Bangalore.

[34] With a population of almost 7 million in 2008, including nearly 5 million migrants, Dongguan is ranked fourth in China in exports.

[35] As of 2012, Chongqing is attempting to create a similar ecosystem, having induced Hewlett-Packard and Foxconn to establish production facilities for computers and peripherals in the city, with the promise that the city would work with them to attract suppliers to the inland metropolis. Together, the two companies will be investing $3 billion (Song 2009).

[36] MNCs account for 87 percent of China's exports of electronic devices and 88 percent of the exports of telecommunications equipment (Moran 2011).

[37] Despite rising wages, new entry and export growth continued in the Pearl River Delta during 2009–2010.

management, marketing, logistics, and human resource management services located in Bangkok city.[38] The metropolitan economies and the advantages accruing from the presence of the central government are such that efforts to disperse economic activities to the central and northern parts of Thailand have made limited headway. Other cities, such as Cairo, Rio de Janeiro, and Johannesburg, with a modest suite of tradable activities, pay a price. Cairo's manufacturing sector is smaller, mainly low tech, and low also in the scale of competitiveness. Services cater mostly to domestic demand and tourism. This constrains productivity gains, technological change, diversification, and growth. São Paulo and Rio de Janeiro are in a similar predicament, having deindustrialized and failed to adequately substitute departing industries with tradable services.[39] Rio, for all its natural beauty, is a city without the leading export and research-intensive sectors that can deliver high rates of growth and employment and lessen the city's dependence on budgetary transfers from the center.[40]

Johannesburg also suffers from slow growth, largely because of the decline of mining and affiliated engineering industries as ore bodies have been depleted and producers have begun shifting their operations to other countries. Engineering industries, which tend to be skill intensive, have created few jobs for South Africa's legions of unemployed, youthful, unskilled workers. Growth prospects of the Johannesburg–Gauteng region look increasingly dim over a longer horizon unless industrial trends are reversed.

What is learned from Chinese and some Southeast Asian metropolitan centers is that, for low- and middle-income countries, a broad manufacturing base, complemented as in Bangkok, Taipei, and Shanghai by the densification of service industries, promises growth and the scope for diversification. Analysis using the Hausmann-Rodrik-Hidalgo product space-mapping technique indicates that production systems lying on the periphery of the product space without many linkages to other product categories, as in the case of Johannesburg and Rio de Janeiro, face difficulty in acquiring the richly networked core activities that contribute to a deepening of industrial capabilities with better longer-term growth prospects.[41] A broadening industrial base and the complementary deepening of business services are the vital sources of local financing: cities that are able to draw upon such financing can support services that underpin continuing development; without resource mobilization, development is quickly imperiled.

[38] Government investment in port and highway infrastructure and incentives for developers contributed to the growth of these cities and the transfer of some of the auto, electronic, machinery, and other industries from the core city areas (see Yusuf and Nabeshima 2010).

[39] A software industry serves the domestic market in São Paulo and Rio de Janeiro, but the cities lack the large firms that account for the performance of Indian IT centers. Cape Town is in a similar predicament: the software/IT industry caters mostly to the domestic finance and insurance industry, which constrains its growth prospects.

[40] The discovery of huge offshore pre-salt oil deposits will increase the revenues accruing to the state, depending, of course, upon the terms negotiated with the center. Whether this leads to the emergence of firms serving the oil exploration, drilling, and downstream activities or instead inflicts damage on the metro economy (so-called Dutch disease) remains to be seen.

[41] See the discussion of the product space and core periphery issues in Hidalgo et al. (2007) where it is explained how various products are related with respect to technologies and sophistication and how closeness facilitates transition from one product group to another.

Financing Urban Development

Urban development assumes the provision of an array of services for businesses and households. If these dip below minimum standards of adequacy, development is impeded and the urban economy begins to stall and unravel. Infrastructure services, public health, education, and police/security services are among the basics. Scarcity of water, for example, can seriously constrain urban development, and poor sewage, waste disposal, and sanitation compromise the health and living conditions of the majority.

Whether a metropolitan region can build and maintain the physical infrastructure, provide basic services, supply affordable housing, and offer recreational amenities is ultimately a function of finances. Transfers from central and provincial level governments (both general and specific) are a source of revenues, but these are on a declining trend as a share of metropolitan revenues in most countries, with the spread of fiscal decentralization and fiscal constraints impinging on central governments. In the interest of sustainability, transfers should constitute a relatively modest source of revenue, and the local tax base should be the primary source of revenues. For a city to be broadly revenue self-sufficient, at least five criteria need to be satisfied.

First, as noted above, revenue generation is a function of the scale of economic activity and how this translates into earnings of residents, the distribution of incomes, and the values of taxable assets. Thus, metropolitan policies to promote business activities, which include fiscal policies and service delivery, are important determinants of the revenue base.

Second, the revenue actually raised depends upon the degree of local tax autonomy and taxes assigned to local authorities. Other fees collected by municipalities supplement taxes, but income and real property taxes generally constitute the bulk of local revenues. To meet expenditure assignments, subnational governments often look to central governments to bridge any gaps, but a sustainable metropolis should in principle be self-sufficient (see Bird 2011). Self-sufficiency also should not be tied to the leasing of land that is providing short-term revenue windfalls for many cities in China (40 percent of revenues on average) and Vietnam but is a rapidly depleting source of municipal income.

Third, the selection and use of tax instruments need to be efficient and to derive the maximum advantage by maintaining incentives for businesses and households to remain in the jurisdiction (see Inman 2007). Moreover, local authorities need to be able to enforce and collect the taxes, especially property/real estate taxes, and regularly assess properties and adjust rates.

Fourth, a metropolis spanning multiple jurisdictions must be able to coordinate regional development to optimize the provision of infrastructures and internalize scale economies where these exist. Equally important is the coordination of tax instruments and rates to avoid distorting incentives and inducing tax arbitrage and Tiebout shopping.[42]

[42] Philadelphia has suffered from a lack of coordination on taxation, land use, and transport development among the 238 municipalities comprising the greater metro area (see Pugh O'Mara 2002). Municipalities offer a

Fifth, fiscal responsibility laws can serve to underscore local responsibilities, minimize moral hazard, and induce fiscally prudent behavior.[43] Furthermore, local government fiscal performance and service delivery can be bolstered by procedures for evaluating performance. Bangkok, much like other metropolitan centers in developing countries, relies on a mix of transfers and locally sourced revenues, but efficiency is compromised by the large number of local government organizations and an inability to effectively analyze the data collected so as to improve monitoring and performance.

Tax revenues can partially finance infrastructure; however, most long-lived capital-intensive facilities call for additional financing, which can come from development grants provided by the center or can be raised by issuing bonds that are guaranteed by the center or provincial governments until such time as a city has established a track record and financial credentials.

Whether via tax revenues or financing through public-private partnerships or the financial market, sustainability first and foremost assumes that industrial development is on track and that the trends are pointing in the right direction. Where the development impetus is weak or failing, financial sustainability can prove elusive. Financial health can also be imperiled by a failure of governance mechanisms, central and local. This includes corruption and malfeasance, which are rife in Karachi and Mumbai, as well as legislative logrolling, when legislators avoid the risk of policy gridlock by indiscriminatingly voting for all new initiatives and, in the process, store up vast problems of indebtedness, as in Brazil, for instance.[44]

The Smarter Metropolis: Harnessing Intelligence and Improving Governance

The globally connected metropolis, which is a "smart city," like Seoul, Singapore, San Francisco, or San Jose, is doubly advantaged because it has the capabilities to exploit the opportunities arising from globalization. There is no precise definition of the smart city. Being "smart" is associated with a number of attributes, including a large percentage of the population with college degrees, state-of-the-art ICT infrastructure, and the early adoption of environmentally friendly and green technologies.[45] However, for our purposes, urban "smarts" or intelligence derives from a concentration of skills and the quality of governance. In other words, being smart has to do with the brainpower a city can marshal to manage and accelerate its development with the help of innovation at many different levels. Alongside depth and quality of human capital, these cities require institutional mechanisms and

bundle of services, amenities, and tax rates, and in principle, the mobile and well-informed individual can choose among competing priced options a la Tiebout (1956).

[43] The bailouts of Rio de Janeiro and São Paulo highlight this problem. Discouraging cities from using long-term debt to finance current expenditures is a key objective. For a review of international experience of fiscal responsibility laws, see Liu and Webb (2011).

[44] Inman (2007) cites a study of U.S. cities showing that a doubling in the size of a city council results in a 20 percent increase in spending per city resident.

[45] Cisco, IBM, and Siemens are among the companies working to create smart networked cities, where computer monitoring and control of activities will increase the efficiency of everything from transport systems to energy and water use. For a description of Cisco's Connected Urban Development approach and how it affects the workplace, transport, energy consumption, and businesses using IT, see Villa and Mitchell (2010).

basic research for generating ideas and avenues of debating, testing, and perfecting these ideas.

The smart city can achieve rapid and sustainable growth of industry by bringing together and fully mobilizing four forms of intelligence: (1) the human intelligence inherent in local knowledge networks enriched by in-migration of people with diverse talents; (2) the collective intelligence of institutions that support innovation through a variety of channels and serve to urbanize technologies, shaping them to suit the environment and making them easily available to users; (3) the production intelligence of its industrial base; and (4) the collective intelligence that can be derived from the effective use of digital networks and online services, a kind of involuntary crowd sourcing that contributes to problem solving and a progressive upgrading of the urban environment (Komninos 2008).[46] Cities positioning themselves to become innovative hotspots (e.g., Singapore and, more distantly, Bangalore) are open to ideas and thrive on the heterogeneity of knowledge workers drawn from all over the country and the world. Moreover, such cities are closely integrated with other global centers of research and technology development (they are a part of the global innovation system), and their teaching and research institutions must compete with the best for talent and to validate their own ideas. Last but not least, because smart cities are at the leading edge of the knowledge economy, their design, physical assets, attributes, and governance need to reflect their advantage over others.

Industrial cities can become innovative cities, and in fact, a strong manufacturing base can be an asset, as it is for Tokyo, Stuttgart, Munich, Seoul, Seattle, and Toulouse. But industry is not a necessary condition: Cambridge (U.K.), Helsinki, San Francisco, and Kyoto are not industrial cities; they are innovative cities that have acquired significant production capabilities that are high tech or Information-tech. As long as a city is part of a metro region or adjacent to one, size can be a secondary consideration and overridden by the advantages of livability. Medium-size industrial cities, by exploiting localization economies, can promote the formation of vibrant industrial clusters. And because they tend to be less congested, medium-size cities can appeal to younger age groups concerned about the cost of living and environmental quality, as well as to members of the creative class who place a high premium on the quality of life, all of which ranks cities with respect to quality of life and creativity and highlights the lead enjoyed by medium-size cities.[47] Of course, only a subset of midsize cities are potential winners, but those that exploit their location and strategically develop the assets that contribute to long-term prosperity can equal or exceed the innovation and productivity advantages of the most dynamic large cities.[48]

A city with an abundance of skills is better positioned to maintain industrial competitiveness, to move up the value chain by assimilating technologies and reinforcing catch up with innovations, and to diversify into more profitable activities as existing ones enter the stage in their life cycle when commoditization lowers entry

[46] The presence of major universities is likely to attract these four forms of intelligence (see Winters 2011).

[47] Depending on the type of industry and environmental regulations, midsize cities can be more or less polluted.

[48] The relationship between size and innovation is analyzed in Carlino, Chatterjee, and Hunt (2007).

barriers, pares profit margins, and triggers migration to lower-cost locations. Glaeser (2005) singles out Boston as a skilled city that has flourished because its world-class universities and urban ambience have made it unusually "sticky" for talented people.[49] The wide base of skills has nurtured entrepreneurs and has led to the proliferation of firms, supported by local venture capitalists and angel financiers, offering jobs for skilled workers. In addition, with the universities generating so many ideas, Boston has recovered from downturns and bouts of deindustrialization by pursuing new technological opportunities using its unique labor pool and financing these with the help of highly experienced, locally based venture capitalists. Boston is not alone—other cities, such as Taipei, Beijing, Singapore, and Bangalore, aided by national policies, are adopting similar models of development to good effect.

The leading smart cities have not only deep pools of skills but also the highest-caliber skill qualities. Growth regressions have uncovered a robust relationship between the quality of schooling as captured by test scores of middle school students and increases in GDP (Hanushek 2010; Hanushek and Woessmann 2010). These results are supported by related findings highlighting the significance of the numbers of students in the upper tail of the distribution of test scores (see Pritchett and Viarengo 2010). A country or city with many students with science and math scores in the highest percentiles has the strongest growth prospects. Singapore, which is top ranked by test scores, also has impressive competitiveness and innovation capacity rankings. It has successfully diversified and sustained an average growth rate of 5 percent since 1995. Shanghai, which topped the Organisation for Economic Co-operation and Development's Programme for International Student Assessment results in 2009, is on its way to becoming a smart metropolis the equal of Seoul and Tokyo. Shanghai is a magnet for talent from throughout China, and this inflow augments its own base of high-quality skills. As traditional light manufacturing industries transfer to cities in Shanghai's hinterland or to the interior, new and more skill-intensive activities are enabling Shanghai to expand in fresh directions appropriate for a city with a per capita GDP that is five times the average for China. Mexico City and São Paulo trail Shanghai's performance, and their prospects are less bright because they have not set their sights on becoming smart cities with human capabilities as the prime source of growth.

Governing the Metropolitan Center

A metropolis will struggle to accumulate and retain talent and create new business lines if urban planning, management, and financing do not provide the necessary preconditions for development. That is, smart urban governance complements other forms of urban intelligence. The topic of urban governance and management is covered elsewhere in this volume. Suffice it to say that the selection and empowerment of city managers are requisites. Smart cities plan ahead, establish realistic monitorable targets, and place a premium on rapid and efficient implementation of policies.[50] Cities such as Singapore, Seoul, and Tokyo draw their governance capa-

[49] On city stickiness, see Markusen (1996).

[50] The grave weaknesses of governments in industrializing countries are not so much in the making of policies as in their implementation.

bilities from the quality of a well-paid municipal workforce and an institutional infrastructure that evolves with changing developmental imperatives and is quick to incorporate IT as well as other technologies to enforce accountability and improve service delivery. The enduring characteristic of smart cities is the awareness of competition and the commitment to incremental progress through benchmarking and learning from other cities. Smart cities, such as Singapore, are not caught unawares by the hollowing out of traditional industries and seek to anticipate and avert or neutralize trends that can lead to the entrenching of slums and environmental decay, both physical and social. Rio de Janeiro, Karachi, and Cape Town have sacrificed many of the advantages that could be derived from producing and concentrating skills because the environment in both cities is rendered perilous by widespread unemployment, serious security concerns, and the obtrusiveness of slums, whether in the core city areas or on the outskirts.

Being smart is all about defining ambitious but achievable development objectives, mobilizing resources using a frequently sharpened set of incentives to deliver results, thinking ahead so as to minimize the risk of being caught unawares, and solving problems expeditiously. Smart cities can raise their game by making full use of technological opportunities as they arise and by inculcating a culture of innovation. However, high-tech and IT intensity is not the answer for most cities, or, at best, is it a partial answer. Smart urban development in Karachi and Cairo would be low-tech yet innovative at the outset while aiming for longer-term growth based on skills and technological capabilities that would narrow the vast gaps in productivity between these cities and some of their competitors in East Asia.

Connectivity

A highly connected metropolitan region enhances productivity and maximizes the benefits from increased trade and capital flows, the circulation of talented people, and the collaborative efforts of researchers in different countries. There are several facets to connectedness, but the two that deserve the most attention are the quality of the ICT and the transport infrastructures and the linkages they help create.

A wealth of research has pieced together evidence mainly from developed countries showing that the cross-sectoral applications of ICT in myriad activities has raised productivity and induced innovation. Erik Brynjolfsson, who is a professor at the MIT School of Digital Business and co-author with Saunders (2010) of "Wired for Innovation," believes that ICT is changing the innovation process itself. He claims that ICT "is setting off a revolution on four dimensions simultaneously: measurement, experimentation, sharing, and replication. They reinforce and magnify each other" and permit the rapid scaling up of innovations (quoted in Hopkins 2010, 52). The United States has been the leader in this regard, although European countries have also benefited, and some developing countries are catching up.

The point to be noted is that the use of ICT for industrial, commercial, or social purposes is to a great extent an urban phenomenon, and because frequency of exchanges via electronic media also increases face-to-face encounters (Leamer and Storper 2001), a metro region well furnished with ICT infrastructure and

recreational amenities is the ideal setting for circulating information, testing ideas, and developing innovation.

Seoul is a classic example of a city with state-of-the-art ICT infrastructure providing locals with unparalleled access to the Internet and the latest advances in mobile telecommunications. Seoul's edge over most other cities derives from the government's ambitious plans to wire the nation, launched in 1995 in enlightened anticipation of a tectonic shift in communications and in the use of media (see Farivar 2011; Lee 2005), and its subsequent initiatives to develop IT-based activities, including the Digital Media City, to support the growth of the digital content industry, a major source of high-value-adding jobs in the metro area.

Productivity gains aside, the large strides made in weaving ICT into the fabric of Korean urban life has spurred innovation, as evidenced by increasing patent output and, more important, the rise in international collaboration between Korean and foreign researchers. Domestic connectivity strengthened urban civil society and energized social and intellectual activities. International connectivity is tightening the linkages that Korea needs to sustain its competitiveness.

Singapore is another example of a city that has leveraged ICT to maximize gains from globalization and has made its business environment the envy of other countries in the region and beyond. Singapore is a leader in technologies to expedite the operations of its busy container port and its world-class airport.[51] It has also used time of day electronic pricing of autos using downtown streets to smooth traffic flows and to minimize congestion. Singapore's e-government platform is the benchmark for other cities, and the government is continuously searching for ways of further pruning transaction costs. Through these investments in ICT, as well as others in education and in health care, Singapore has strengthened connectivity, attracted investment in productive activities, and raised total factor productivity. Other cities, taking note of the benefits accruing to Seoul and Singapore, have begun investing in infrastructure and training, but what they frequently neglect is a comprehensive approach encompassing financing, which is the key to mutually reinforcing gains from several interlocking activities.

A major metropolis seeking greater connectivity must also look to its airport and, if it is a coastal city, its port facilities. An urban economy reliant on trade—and the foremost metropolitan regions depend upon trade to boost domestic sources of demand by a few percentage points—must enlarge and grease the channels through which trade flows.[52] The economic significance of ports has long been recognized. A busy port has a large footprint, employing tens of thousands, and consumes a wide assortment of locally produced services.[53] The contribution of a major international airport equals and may exceed that of a port. By value, close to one-third of global trade is now shipped by air.[54] This includes high-value electronic

[51] On Singapore's Portnet IT-based business-to-business system, see Portnet.com (n.d.).

[52] São Paulo's Port of Santos has long been a bottleneck, even though the cost and the roots of its inefficiency are well known (see Doctor 2002).

[53] Cities with major ports are coming to recognize the air and water pollution caused by shipping but have been slow to take remedial action, although some are preparing to offer docked ships power sources to run their systems.

[54] On the importance of air cargo services, especially for high-value goods, see Leinbach and Bowen (2004).

products and pharmaceuticals, cut flowers, and meat and other farm products requiring a cold chain, and the percentages are rising as the cost of air transport declines in relative terms with the introduction of larger fuel-efficient aircraft. In addition, airports serve as the gateways for the export of tourism and business travel services that cities such as Cape Town, Rio de Janeiro, Cairo, and Bangkok depend upon for the large slice of their earnings from trade. As air transport has increased its share of trade, major airports with space around them are becoming the foci of industrial, agricultural, and service clusters, as in the case of Dubai.[55] A classic example is Dulles International Airport, which serves the area in Washington, DC, that is the axis of IT, telecommunications, and defense industry clusters and the growth driver for the metropolitan region.[56] Other cities are also discovering that airports can stimulate clustered industrial activities through connectivity and induced employment. Songdo, a city that is sprouting IT activities adjacent to Incheon International Airport in Seoul, is one example (see Songdo IBD 2012); Bangkok's new Suvarnabhumi International Airport is another. Both cities see these airports as hubs for new activities with a high trade component.

The Sustainability Imperative

A metropolis that is deemed smart and successful must also meet the test of sustainability. Metropolitan economies in low- and middle-income countries, after decades of growth in the 5–8 percent range, must strive to generate enough employment, raise living standards of the vast majority to socially acceptable levels, and find the resources to address legacy problems and upcoming challenges, not to mention environmental and economic shocks.

Today's metropolitan regions emerged in most instances with a minimum of planning and without much attention given to resource constraints or long-term environmental considerations. Low energy prices, transport subsidies, cheap land, low property taxes, the lure of automobility, and the emergence of powerful lobbies composed of real estate developers and auto manufacturers together led to horizontal, sprawling urban development. Unfortunately, urban planning as actually practiced remains frozen in time, and one can see the dead hand of the past in industrializing economies such as China, Malaysia, Indonesia, Nigeria, and South Africa, and also in North America, which provided the model of the sprawling metropolitan region.[57] This form of development, while it surely gives city dwellers more living space, requires costly investment in transport, water, sewage, and energy infrastructures and greatly increases dependence on private automobiles.[58]

[55] The greenhouse-based cut flower business around Addis Ababa also depends on air transport to ship flowers to markets in Dubai and The Netherlands. Looking a decade into the future, rising fuel costs could put a damper on air shipment, absent major gains in productivity.

[56] This clustering has given rise to Internet Alley in a four-square-mile area named Tyson's Corner, a short drive from Dulles International (see Ceruzzi 2008).

[57] In China and Vietnam, the dependence of municipalities on revenue from land leasing (40 percent on average) makes a retreat from sprawl even harder. North America is the model also of the sprawling industrial and science parks that have proliferated in developing countries (O'Mara 2007).

[58] It also imposes a heavy burden on the poor living on the fringes of the city who must engage daily in long and costly commutes, as in, for instance, Johannesburg and Rio de Janeiro.

Sprawl also goes hand in hand with eating and exercise habits that are injurious to health (Frumkin, Frank, and Jackson 2004).

The sprawling metropolis, with its low densities (see Seto et al. 2011) and its emptiness, poses a huge challenge for sustainable development.[59] Sustainability is predicated on energy and resource conservation and on the building of robust and resilient infrastructures. The model of a resource-frugal city is compact and vertical, with high population densities that permit the efficient utilization of public transport.[60] This model, attractive to efficiency- and resource-conscious planners, may be coming into vogue, but it should not take the form of the "tower in the park" model so popular in China, which is much more energy intensive and isolating than the mixed-use neighborhoods it is displacing.

A doubling of urban populations demands a rethinking of how people can be accommodated, especially if there is a growing need to conserve energy and the fertile farmland adjacent to cities. The need to invest in facilities to protect the more vulnerable cities from the consequences of climate change is another factor that will be harder to realize given the declining trend in global savings linked to aging populations in the developed world, as well as in some industrializing countries. The imminence and seriousness of each of these can be debated. Legacy housing, transport and public utility infrastructures, and inertia arising from habit persistence and entrenched lifestyles are huge obstacles to changing the pattern of urban development that cannot be ignored, but retrofitting these cities will be unavoidable. Resistance to increasing energy and water prices, to pricing the externalities arising from unchecked private automobile use, to raising and collecting real property taxes, and to modifying zoning and floor area regulations affecting land use (Mumbai is a frequently cited example) is fierce in all countries.[61] The political economy of urban development in virtually all countries favors endless delay. This is because politicians with short time horizons have few incentives to champion radical policies; interest groups with a stake in the status quo forcefully oppose actions that would jeopardize the rents they gain from existing arrangements; and households reflexively oppose higher taxes and prices. Even severe fiscal crises, the threat of spiraling energy prices, and the increasing frequency of severe weather events seem unable to persuade metropolitan residents in advanced and developing countries that delay is fast becoming an unaffordable luxury.

The issue of urban sustainability is here to stay, and with each passing year it will only become more pressing. In different ways, sometimes obliquely, sometimes directly, it is being debated in crisis-ridden advanced countries in a state of political paralysis, such as the United States; in industrializing countries currently with deep

[59] The architect Rem Koolhaas remarks that "there are city centers around the world in which no one seems to be a full time resident" (quoted in Heathcote 2010, 4).

[60] This point is strongly championed by Glaeser (2011). Interestingly, although Manhattan is compact and densely populated, the New York metro area covers 3,000 square miles (Greater London is 600 square miles; Paris, 1,000 square miles), and it is significantly less dense than Los Angeles, the supposed epitome of a sprawling metropolis (with 7,738 residents per square mile vs. 5,728 per square mile for New York). But for all its density, Los Angeles is not a walkable city (Rybczynski 2011). Metropolitan São Paulo covers 8,000 square kilometers, while the Cape Town city region stretches almost 100 km from end to end (UN-HABITAT 2008).

[61] Regarding automobile use, the vision of "mobility on demand" offered by the MIT Media Lab is alluring, and bit by bit some elements of this are taking shape. Whether it or something like it is a part of the metropolitan future, and not in just a few enlightened cities but worldwide, remains to be seen.

pockets where urbanization is approaching a midpoint, such as China; and in low-income countries in the crosshairs of climate change, such as Pakistan, struggling with acute resource scarcities, limited organizational capabilities, and dysfunctional governance. Reluctantly, and later rather than sooner, the great metropolitan centers throughout the developing world will translate the concept of sustainable urbanization into practice through a physical redesign of cities and the widespread incorporation of green technologies and resource-frugal ways of living. Legacy infrastructures cannot be wished away overnight; however, through a process of deconstruction, retrofitting, adaptation, and new construction based on green templates, cities will be transformed if they are to remain livable and economically dynamic. It may be too late to maintain atmospheric carbon dioxide concentrations below the desired 450 ppm; mankind will need to adapt to the 550-ppm atmosphere toward which the planet is heading.

Concluding Observations on the Metropolitan Future

Continuing urbanization and global warming are among the few trends about which there can be little doubt. But no one can claim with reasonable certainty that an increasing number of metropolitan regions will adopt the coherent long-term strategies that will lead to smart, IT-enabled, compact, vertical, mixed-use, green, and sustainable development, including in Beijing, Karachi, and São Paulo, to take just three very dissimilar metro regions.[62] Although many initiatives abound, with cities forming alliances and eagerly sharing experiences, the organizational capabilities underpinned by political consensus and the mechanisms for formulating long-term strategies and mobilizing resources seem far too elusive from the current perspective. City managers have internalized few lessons on effectively planning and financing urban development or in promoting tradable activities that can be a source of jobs, and too many cities remain vulnerable to financial crises. Despite recurrent fiscal debacles, local politicians and city managers are unable to learn enduring lessons, and the accumulating research on urban fiscal policies has failed to substantially improve urban tax systems worldwide.

The advantages, and also the drawbacks, of the compact city have been aired for many years, but the fast-growing metro regions in emerging economies have ignored these. The technologies, hard and soft, that can make a city "greener" have been taking shape and are being tested piecemeal, but little has been achieved to date. Not one of the tiny experimental green cities currently under construction has been put to the test and its carbon neutrality convincingly established.[63] The livability of compact and green cities and how they would accommodate diverse industrial activities are also unknowns. The technologies coming off the drawing boards, and some being commercialized, are perhaps decades away from wide-

[62] For example, the World Bank (2009) notes that in China the fragmentation of land on the fringes of cities is growing worse, land use is not being coordinated with the development of urban transport, and floor area ratios are increasing much too slowly. In fact, the gross floor area ratios of Chinese cities are far lower than in Seoul or Tokyo and much lower than in Manhattan.

[63] Some incredible specimens of the green city are taking shape in Abu Dhabi (Masdar), in Tianjin, in Shanghai, and in Seoul–Incheon, but their economic and social viability and carbon neutrality remain to be established (see also Kahn 2010).

spread application once they have been debugged and made more affordable. However, building sustainability cannot wait. Karachi, Dhaka, Cairo, Shenzhen, and São Paulo are daily pouring more concrete into the ground, accommodating more people, and building more roads. Instead of densifying, urban densities are declining. Bangkok's urbanized area grew 16-fold from 1944 to 2002; that of Accra, by 153 percent from 1985 to 2000.

These are frightening trends and missed opportunities. Left unchecked, they will make rationalization of urban development far more difficult. Some economists are of the view that price adjustments reflecting energy and water scarcities, increased vulnerability of cities near rivers to flooding and coastal locations to rising sea levels, and inland areas to droughts and firestorms will bring about the redistribution of the population, force a refashioning of the urban landscape, and demand the building of passive and active coastal defenses, as in The Netherlands (see Kahn 2010).[64] Economists rightly underscore the strength of market mechanisms but are apt to minimize its failings, as evidenced by the devastating financial crisis of 2008 and 2009 and the many real estate bubbles.

From the perspective of urban sustainability and green development, market-induced changes might be too slow, too myopic, and too piecemeal, and the market might not promote the kind of fast-paced innovation that is urgently needed or provide the insurance required by inhabitants of vulnerable cities in developing countries.

On the current trajectories, Karachi and Lagos could become the world's two largest cities by mid-century, assuming that the availability of water (fresh, desalinated, and recycled) permits such growth. A doubling of populations with no change in the layout will lead to metropolitan regions that suffer from agglomeration diseconomies and are ungovernable.

Advanced countries may have the resources to indulge in wasteful sprawling urban regions, and they may even endure deindustrialization for several decades by living off their accumulated fat. But industrializing countries need to learn quickly and avoid the costly decisions made when energy, land, and water were relatively cheap, green technologies were unknown, and global warming was a scientific curiosity. Low-income countries have even less room to maneuver because they lack the growth momentum of the leading middle-income nations, as well as the technological capabilities and resources, and in addition, they must cope with rapidly expanding populations.

With so much urbanization still lying ahead and the stakes rising, the design and implementation of forward-looking urban development strategies are taking on a heightened importance. Whether countries make rapid strides on the economic front will depend upon one or a small handful of metropolitan centers. And whether these are smart, sustainable, economically dynamic, and livable will also depend on how cities develop organizational and technical skills, assure revenue autonomy, create agile infrastructures (soft and hard), and make the best use of evolving practical ideas and technologies to take existing and budding metropolitan regions boldly into an uncertain future.

[64] See Jha et al. (2011) on both the magnitude of the problems and remedial measures.

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