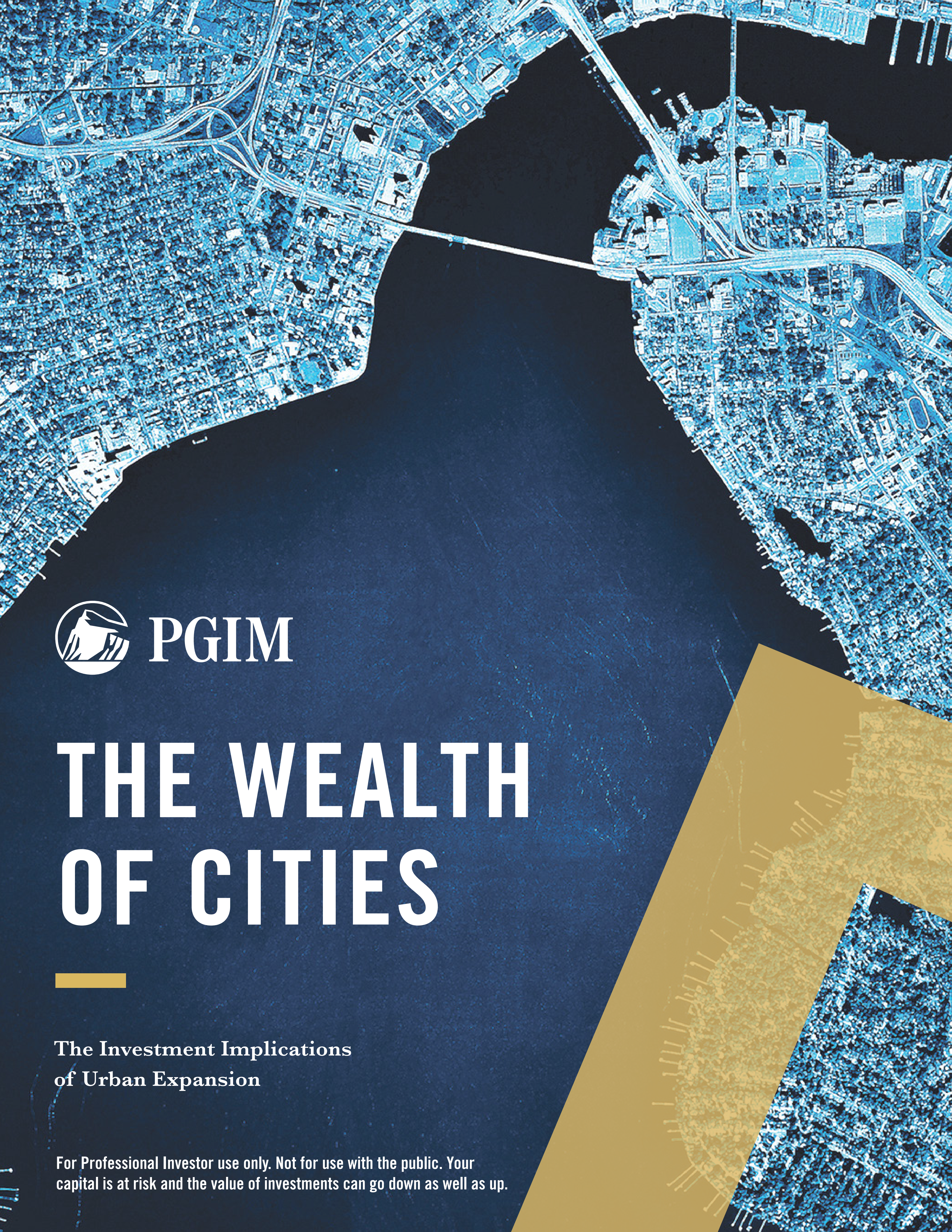


PGIM

THE WEALTH OF CITIES

The Investment Implications of Urban Expansion

INTRODUCTION

Just three decades ago, Shenzhen was a modest fishing village of 30,000 people on the south coast of China. Today, it is a booming metropolis of 10 million inhabitants, boasting modern skyscrapers, packed shopping malls, and a state-of-the-art transportation system. The breathtaking speed at which Shenzhen became one of the world's largest cities typifies the "prime time" of urbanization that is now upon us. The growth of cities is a well-told story. But never before has the pace of urbanization been so rapid: some 60 to 70 million people will be added to the urban population each year for the next 30 years.

The mega-trend of urban expansion opens up important new opportunities for institutional investors. For starters, the unparalleled pace of urbanization means that by 2030, about 200 cities worldwide are likely to join the ranks of metropolitan areas with at least one million people. As the rate of urbanization ramps up, global infrastructure needs are projected to top $50 trillion through 2030, with heavy spending required in both developed and emerging-market cities. In developed markets around the world, mature cities are being revived and innovation hubs are being established. "Smart cities" that focus on the intelligent use of information and communication technology, energy efficiency, and more productive transportation systems are being cultivated in North America, Europe, and other developed countries. Global middle-class consumption, meanwhile, will shift towards cities in China, India, and other emerging Asian countries, as developed countries see their share decrease. In India, for instance, middle-class spending is projected to reach $1.8 billion annually by 2020, six times the level in 2010. And the world may need to produce about 50% to 70% more food by 2050, thanks in large part to the swelling ranks of middle-class city dwellers.

But many potential opportunities resulting from the urbanization boom are hard for investors to access due to absent or insufficient market mechanisms. With that in mind, we set out to identify investment ideas arising from the trend of urban expansion that could be accessible to institutional investors. Our approach included interviewing a range of investment professionals across PGIM, in addition to industry and topical experts. We believe investors should focus their attention on four major investable themes: urban infrastructure, real estate, consumer goods and services, and the evolving agricultural supply chain. Within these broader themes, we have identified 10 specific investment ideas in both emerging and developed markets across a range of public and private vehicles. Collectively, they offer a spectrum of attractive avenues for benefiting from the "prime time" of urbanization.

One thing is certain: just as the current pace of urban population growth has never been seen before, it will likely never be repeated again. In 30 years' time, the urban story will still continue, but the rate of change will taper off — as will the investment opportunities resulting from urban expansion. Investors should consider examining the opportunities now arising from this unprecedented population shift.

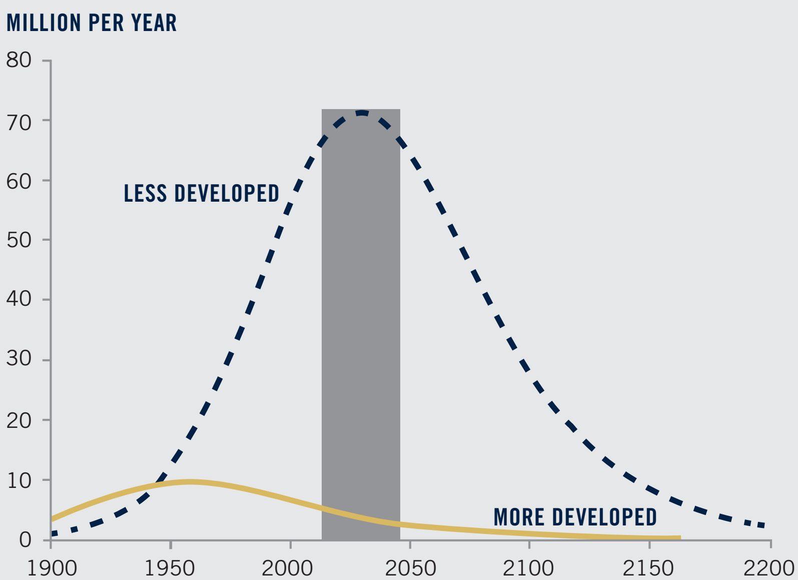
PART 1: THE "PRIME TIME" OF URBANIZATION IS UPON US

The growth of cities is a well-told story. But never before has the pace of urbanization been so rapid: some 60 to 70 million people will be added to the urban population each year for the next 30 years, according to detailed projections developed by Paul Romer and Brandon Fuller of New York University (Exhibit 1).[1] And unlike past booms in urbanization, the trend today is primarily being driven by emerging-market countries. In more developed nations, the peak movement to cities is already 50 years in the past.

Exhibit 1

The "prime time" of urbanization is upon us: 60-70 million people will be added to cities every year for the next 30 years

Observed and projected number of new urban residents



YEAR	2010	2110	CHANGE FROM 2010
Urban Residents (bn)	3.6	9.0	+5.4
Rural Residents (bn)	3.3	2.0	-1.3

Note: "Less Developed" / "More Developed" refers to the development stage of various regions of the world
Source: Fuller, B./ Romer, P., "Urbanization as Opportunity"

The urban project has a beginning and an end

Just as the current pace of urban population growth has never been seen before, it will likely never be repeated again. The rise of great new cities first began during the Industrial Revolution; back in 1800, only 3% of the world's population lived in cities according to the United Nations,[2] and it took until about 2007 for the number of urban dwellers to surpass their rural counterparts. The process has now accelerated and will soon taper off: while the United Nations projects that cities will be home to about two-thirds of the world's inhabitants by 2050,[3] the urban proportion of the population will get close to maxing out at around 80% — or about nine billion city dwellers — at the turn of this century, according to projections by Romer and Fuller (Exhibit 2).[4]

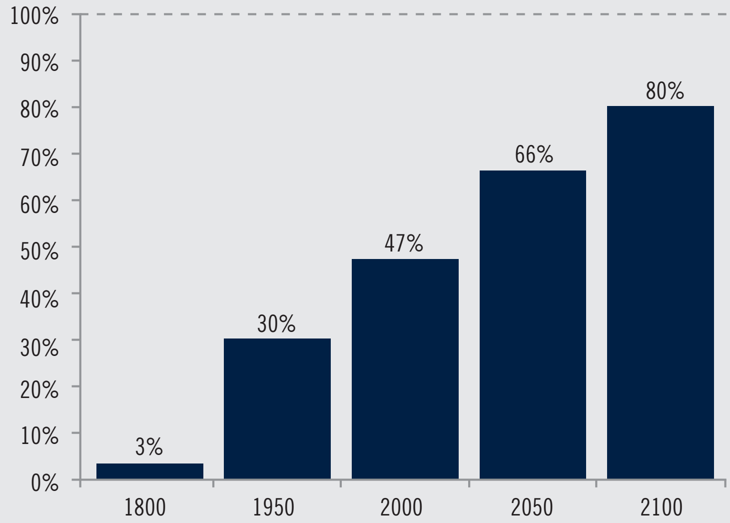
Asia is driving the urbanization boom

Today, North America has the highest urbanization level, followed closely by Latin America and Europe. All of these regions began to urbanize decades ago and are now at a mature stage of the process. By contrast, the movement to cities is still accelerating in both Asia and Africa. According to the United Nations, by 2025, more than half of the world's urban population — or about 2.5 billon people — will live in Asian cities (Exhibit 3).[5] China in particular is experiencing a period of massive, rapid urbanization on a scale never before witnessed. In early 2014, the Chinese government approved a plan to shift another 100 million people to urban areas by 2020, in a bid to

Exhibit 2

By 2050, cities will be home to two-thirds of the world's inhabitants

Urban residents as a percentage of total population



Source: UN – "Urban Millennium," *The Economist (for 1800)*; UN Department of Economic and Social Affairs – Population Division *(for 1950-2050)*; Fuller, B./ Romer, P., "Urbanization as Opportunity" *(for 2100)*

improve economic growth. By then, about 60% of the country's 1.3 billion people will be living in cities.

In India, meanwhile, only about 30% of the population currently lives in cities. That, too, is quickly changing: within 15 years, the number of urban residents will be equal to twice the entire population of the U.S., according to projections by McKinsey & Company. By then, 13 Indian cities may each have populations over four million; Mumbai and Delhi, which today have populations of about 10 million apiece, could each be home to more than 30 million inhabitants, based on United Nations' estimates. Africa also has some of the world's fastest-growing cities, and by 2025, its urban population is expected to be double that of North America's.

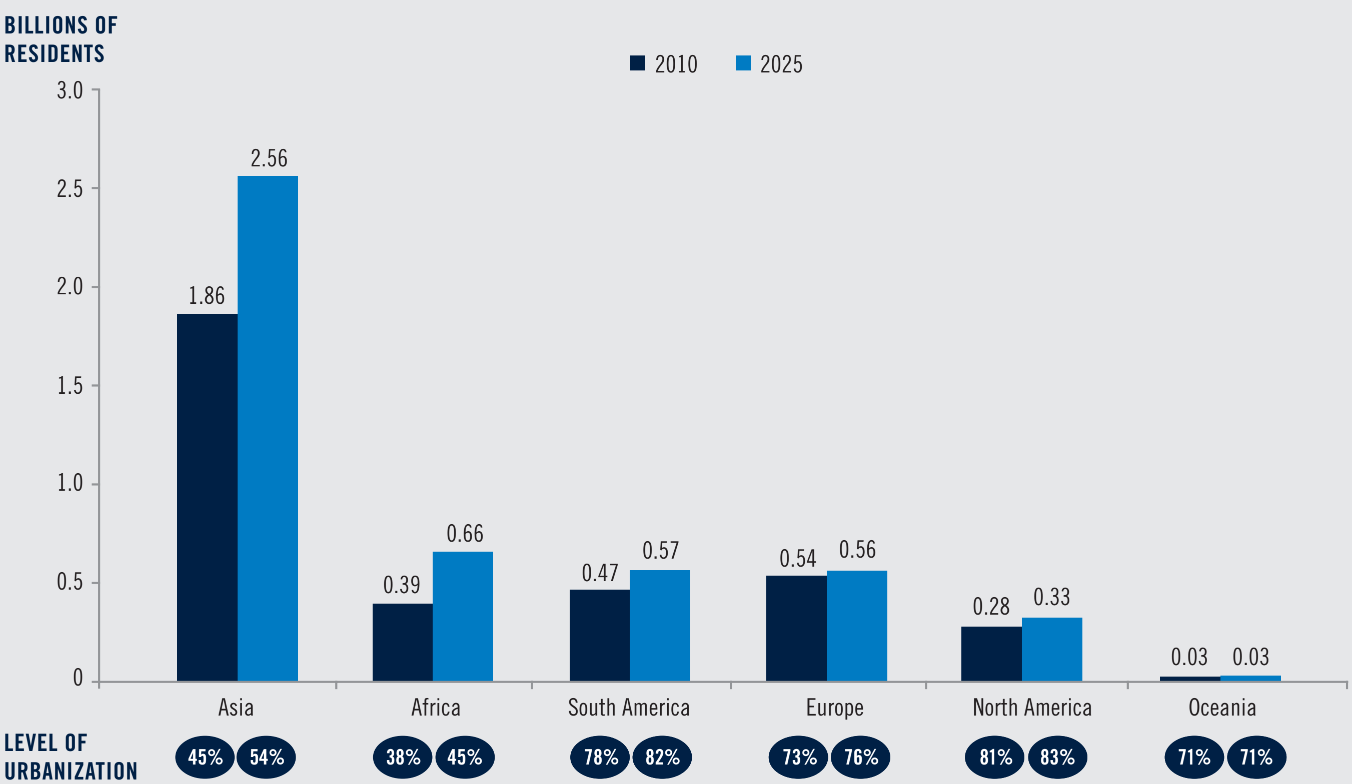
A sharp rise in the number of cities

The unprecedented scale of urban migration, combined with organic growth within cities themselves, will mean that by 2030, some 200 cities worldwide will join the ranks of metropolitan areas with at least one million people, for a total of approximately 660 cities with at least that many inhabitants, according to the World Bank (Exhibit 4).[6] To put that number

Exhibit 3

Between 2010 and 2025, Asia alone will add 700 million people to cities

Global urbanization – 2010 vs. 2025



Note: Urban vs. rural defined according to the criteria used by each area or country
Source: UN Department of Economic and Social Affairs – Population Division

in context, the U.S. today has about 50 such metropolitan areas. Moreover, urbanization will propel almost 20 cities into the mega-city bracket (population of 10 million or more) by 2030. The growth in the number of cities also includes the formation of brand-new cities. For example, the Indian government recently announced plans for a $1.2 billion investment — supplemented by private funding — to build 100 "smart cities," many of them new urban centers, along the Delhi-Mumbai Industrial Corridor.

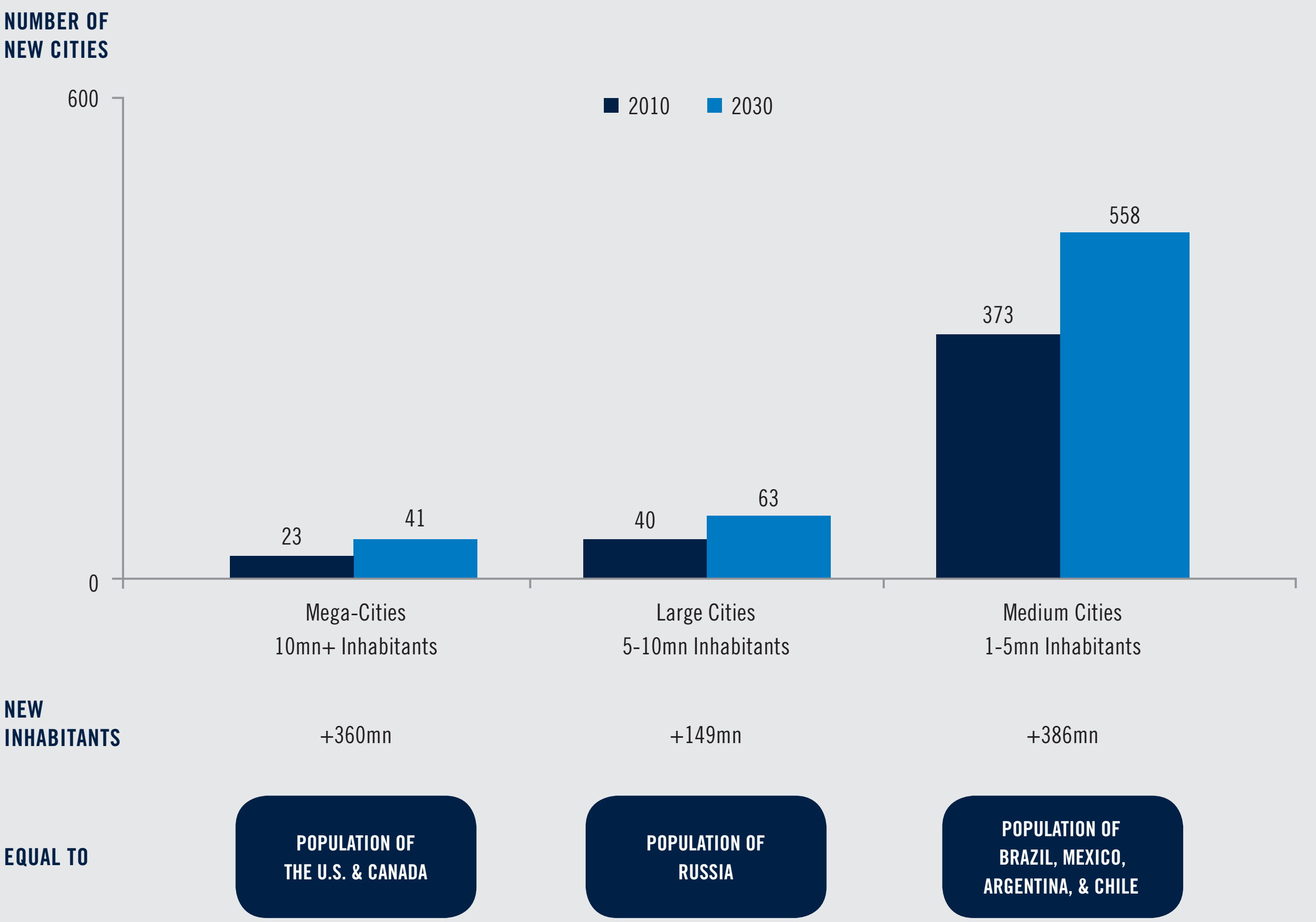
As cities become larger, denser, and more numerous, the effects on residents, governments, and businesses alike will be substantial. For urban residents, the growing city offers new opportunities for employment, wealth creation, recreation, and lifestyle improvements. But accompanying that growth are the headaches of crowding, traffic, pollution, crime, and potential water shortages.

Governments have a major role to play as well, ranging from the cost-effective delivery of public services to the efficient use of tax revenues to build the public infrastructure required to support a growing city — for example, wider roads, more schools, and better hospitals. And as urbanization progresses, political dynamics also change within countries. Bangkok, for example, has been at the center of Thailand's ongoing political crisis, which has in part stemmed from the economic and political divide between the country's rural population and the rising urban middle class. And of course, companies are also key players in the urban landscape, as they are naturally attracted to cities that provide access to a skilled talent pool, a growing population of urban consumers, robust infrastructure, and easy-to-navigate city regulations.

In fact, the combination of residents, governments, and companies can be powerful in shaping the revival, decline, or transformation of cities around the world. In developed countries, for example, vacant industrial space and underused downtowns are being targeted by urban planners and the private sector for revitalization. These projects, in addition to producing jobs, create or enhance the urban core, and might even change the face of a city. They often involve the building of green, open spaces in urban areas and the creation of an urban environment that is more attractive

Exhibit 4

By 2030, more than 200 cities will join the ranks of metropolitan areas with at least one million inhabitants



Note: Cities with fewer than 1mn inhabitants are not reflected in the figures above
Source: World Bank; UN Department of Economic and Social Affairs – Population Division

to workers (especially younger generations) and tourists. For instance, in Germany, Hamburg's HafenCity has become one of Europe's largest urban development projects. The 25-year, $10 billion project, which began in 2000, has converted a run-down harbor and industrial area into a vibrant mixed-use development with offices, condos, and restaurants, along with public spaces and tree-lined streets.

Another example of the powerful interaction between private and public sectors are innovation hubs (Exhibit 5). In the U.S., innovation districts have been established in cities across the country, including Boston, Seattle, and Raleigh. The Boston Innovation District, for example, was created to transform 1,000 acres of the South Boston waterfront into an urban environment that fosters innovation, collaboration, and entrepreneurship. So far, the initiative has added more than 5,000 new jobs from about 200 new companies, with technology firms leading the way. Similar innovation hubs are being established around the developed world. For instance, Songdo, South Korea is a brand-new development located about 50 miles from Seoul scheduled for full completion in 2018. Established on 1,500 acres of reclaimed land, the city is distinguished by its focus on sustainability, including building design, systems engineering, urban infrastructure, and community planning. With more than $10 billion invested and 100 buildings completed or currently under construction, Songdo is expected to become a key business hub in Northeast Asia.

Ultimately, whether it is urban renewal or new innovation hubs, when urban residents, governments, and companies work successfully in tandem, they can unleash a powerful, virtuous cycle of urban growth and wealth creation. We explore the critical mechanisms that drive this phenomenon in the next section.

Exhibit 5

Innovation hubs are being established in cities around the world

INTERNATIONAL BUSINESS DISTRICT – SONGDO, KOREA

INNOVATION DISTRICT – BOSTON, MA

TECH CITY – EAST LONDON, UK

INNOVATION SQUARE – GAINESVILLE, FL

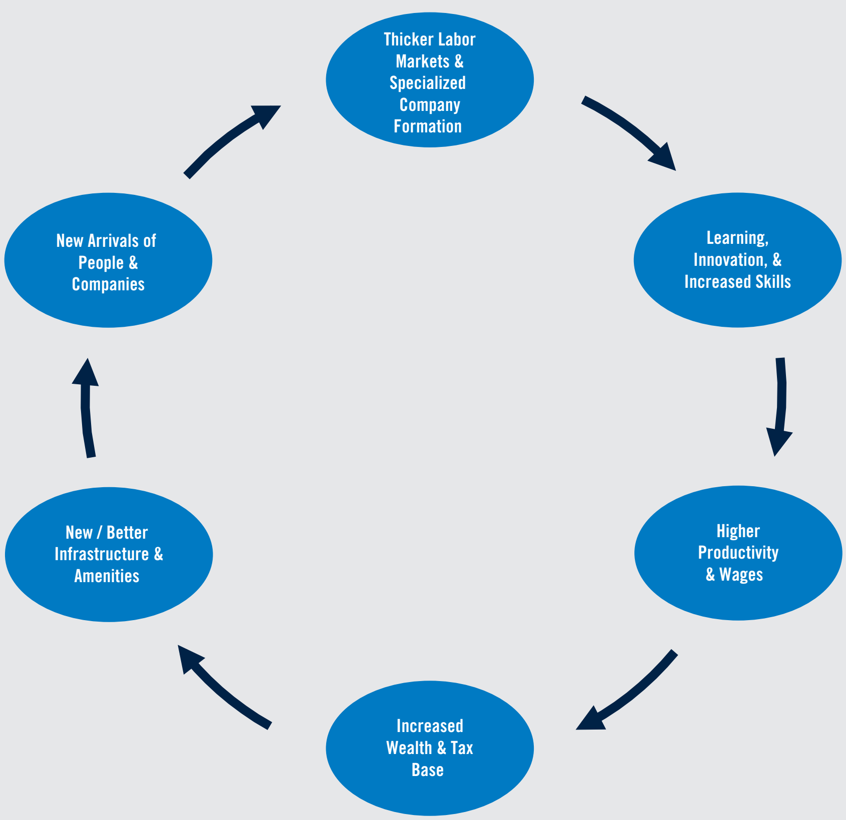
Source: Boston Redevelopment Authority; Perkins+Will

PART 2: AN ACCELERATING CYCLE OF URBAN WEALTH CREATION

Across much of the world, a fundamental economic transition from agriculture to manufacturing and services has transpired over the past two centuries. The economies of scale associated with this industrial transformation have, in turn, driven the vast migration of people from the rural farm to the urban factory floor, as outlined in Part 1. But city formation is not just the accidental by-product of industrial development; it is an integral driver of continued productivity gains and economic growth. Once cities cross a tipping point, a self-sustaining virtuous cycle can continue to propel them forward (Exhibit 6).

Exhibit 6

The virtuous growth cycle of cities creates wealth



Source: Glaeser, E., *Triumph of the City*; Moretti, E., *The New Geography of Jobs*; *The Economist*; Interview with Dr. Paul Romer

The virtuous cycle begins with deep labor markets, encompassing many buyers and sellers, which allow skilled individuals to earn the full return on their human capital and enable companies to source the most appropriate, specialized talent. These inter-linkages have been analyzed and proven by a range of academics such as Enrico Moretti at the University of California, Berkeley, Edward Glaeser at Harvard University, and Romer and Fuller at New York University.[7] The technology clusters formed in places as diverse as Bangalore and Silicon Valley are tangible examples of the benefits these markets bring. Deep labor markets also increase efficiency by allowing individuals to move up the career ladder more rapidly and reducing the downtime from unemployment between jobs, as there is a richer pool of potential employers.

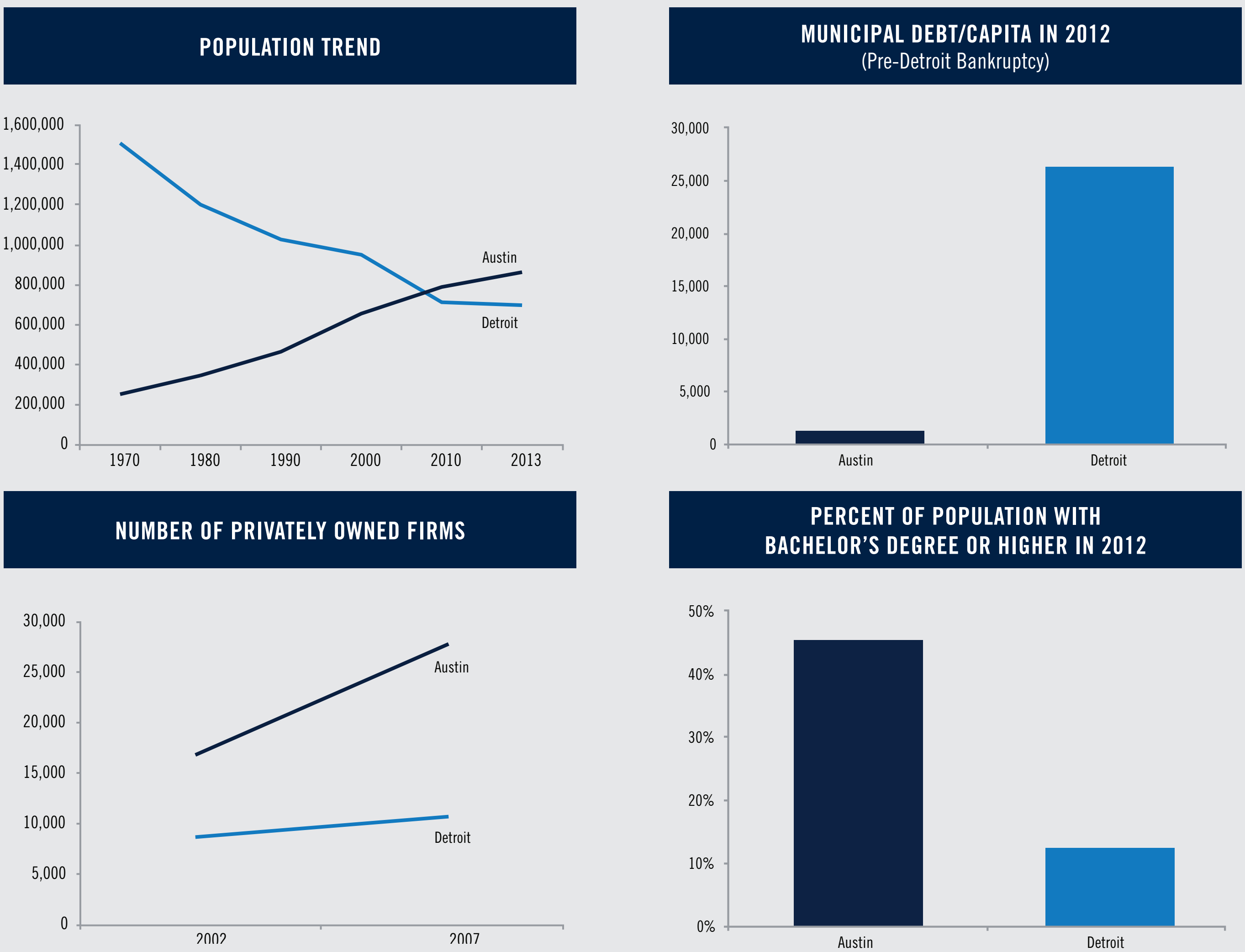
At the same time, a diverse set of specialized companies — more efficient and more productive — form along the urban supply chain. Examples include firms specializing in taxation, software, advertising, data processing, and specialist-parts supply and repair. In a city the size of London or New York, for instance, a financial services firm can be disaggregated into retail banking, corporate banking, and investment banking, with further specializations in mergers and acquisitions, mortgage finance, and so on. And since these services typically require face-to-face interaction with clients, specialized providers need to be established within cities where a critical mass of local clients exists.

Perhaps most critically, cities are also the breeding ground for creativity and innovation through the cross-pollination of ideas and the rapid dissemination of these new learnings. In cities, both workers and entrepreneurs alike can learn more rapidly from each other. As the legendary economist Alfred Marshall implied about knowledge spillovers in 1890, "The mysteries of the trade become no mysteries; but are as it were in the air."[8] Even today, despite all the technological advances that allow us to work remotely, new ideas seem to flourish when there is face-to-face interaction. In other words, urban centers appear to foster the exchange of ideas and technology to produce greater innovation and growth.

Rising skills and wages, driven by the productivity advantage, in turn attract new talent to cities. In the U.S., for example, workers in large metropolitan areas earn 30% more than their non-urban counterparts, according to Harvard's Glaeser and economist David Maré.[9] And in China, average urban incomes are roughly three times greater than rural incomes, according to a World Bank study on rural-urban inequality in the country.[10] The presence of skilled, productive workers drives more firms to establish operations in the city, generating the tax base and scale for more government investments in infrastructure and public services.

Exhibit 7

Detroit versus Austin: the fortunes of two cities within the same country can diverge dramatically



Source: U.S. Census Bureau – Quick Facts

When the virtuous cycle gets broken

When cities get stuck in a bad equilibrium, the virtuous cycle can dramatically reverse itself: skilled workers do not migrate because they know there are not any jobs, and in turn, new companies do not want to establish a presence because they know there are no skilled workers. The bankruptcy of Detroit is a stark reminder of this phenomenon. As jobs began to dwindle, property values fell, tax revenues dropped, and crime soared. Educated, skilled workers flocked to the suburbs, leaving an increasingly debt-laden city behind. When the financial crisis hit in 2008, the auto industry collapsed, eventually taking Detroit down with it.

The failure of cities in general has been widely analyzed. As was the case with Detroit, a leading cause is an over-reliance on one industry, which can cause complacency, lack of cross-sector industry innovation, and losing out on the talent war for innovation-minded knowledge workers. Unwelcoming tax and regulatory policies at the state and local level are another factor. High debt and financial commitments taken on during good times, and an overinvestment in politically driven projects (at the expense of investments in schools and public safety) leads to a decay of public infrastructure and a loss of population. Self-reinforcing population trends are hard to break, as human capital is at the core of a city's growth.

City-level opportunities vary dramatically, even within the same country

As Detroit was descending into bankruptcy, Austin, Texas was well into its ascent from a small college town to the eleventh largest city in the U.S. A business-friendly environment and highly educated labor market were key factors propelling the city upward. Companies from a diverse array of industries, including energy, technology, healthcare, and financial services, have all established a large presence in Austin. The city's fast rise in comparison to Detroit's decline is a vivid example of how two cities, despite being in the same country, can find their fortunes diverging dramatically (Exhibit 7).[11]

Italy offers another example of cities with divergent paths: the economies of northern cities like Milan and southern cities such as Naples have unfolded in vastly different ways, especially since the financial crisis. Milan is the home to luxury brands and high fashion; Naples faces chronic unemployment, underinvestment, and industrial contraction. In the aggregate, the gross domestic product of cities in the north of Italy is now twice that of cities in the south. And, for the first time since World War I, the death rate in the south recently outstripped the birth rate — the region's population could lose more than four million people over the next half century. As we will explore in the next section, the dramatic variations in city-level opportunities within the same region has important implications for investment opportunities at the city level.

PART 3: INVESTABLE IDEAS FOR CAPITALIZING ON URBAN EXPANSION

Many potential opportunities resulting from the urbanization boom are hard for investors to access due to the insufficient market mechanisms surrounding them. For example, while roadways within new emerging-market cities need to be built, investors often encounter difficulties in accessing and executing these types of transactions, especially given the high degree of government involvement and regulatory complexity. We believe institutional investors should focus their attention on four major investable themes: urban infrastructure, real estate, consumer goods and services, and the evolving agricultural supply chain (Exhibit 8). Within these broader themes, we have identified 10 specific investment ideas in both emerging and developed markets that could be accessible across a range of public and private vehicles. Collectively, they offer a spectrum of attractive avenues for benefiting from the "prime time" of urbanization.

Exhibit 8

Investors should examine investment opportunities related to urban expansion in four primary areas

URBAN INFRASTRUCTURE

Global need for infrastructure estimated at over $50 trillion through 2030, much of it in urban areas

REAL ESTATE

Global stock of institutional-grade real estate to expand from $30 trillion in 2012 to $70 trillion in 2030

CONSUMER GOODS & SERVICES

Annual global demand in personal consumption expected to be over $40 trillion by 2020

AGRICULTURE SUPPLY CHAIN

Food demand projected to grow 50-70% by 2050; rural population expected to decline by over one billion by the end of the century

Source: McKinsey Global Institute; A.T. Kearney; PwC; CCAFS

1. Urban Infrastructure

As the pace of urbanization continues to ramp up, global infrastructure needs are projected to top $50 trillion through 2030, with heavy spending required in both emerging and developed-market cities (Exhibit 9). Emerging markets need many basic services — starting with water and sewerage, followed by electricity and transportation networks — as they modernize. By contrast, in developed markets the investment opportunity is largely about replacing and improving existing aging assets. Within the broader urban infrastructure theme, we believe four investment opportunities are particularly attractive (Exhibit 10).

Exhibit 9

Global infrastructure needs are estimated to be greater than $50 trillion through 2030

MAJOR INDIAN CITIES

$250bn Spending required to accelerate road construction for trade routes between major cities

LONDON

$40bn Spending required to improve transportation systems, including subway and roads

LAGOS

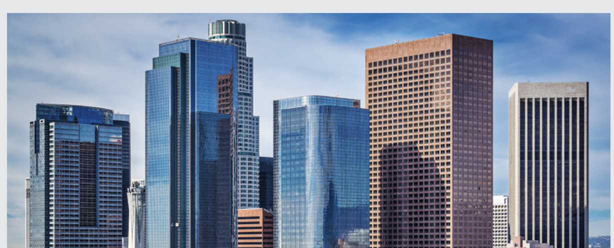
$50bn Collective spending on free trade zone & economic center, including construction of a deep-sea port

NEW YORK

$47bn Spending required to repair decaying infrastructure – sewer mains, gas lines, and bridges

RIO DE JANEIRO

$11bn Projected spending on 2014 World Cup & 2016 Olympic Games associated infrastructure



LOS ANGELES

$15bn Spending required to replace and upgrade public works, including major water mains and pipes

Source: BoA Merrill Lynch Global Research; *The Guardian*; CNBC; *Crain's New York*

Wired cities

By 2020, the number of global Internet users is projected to double to four billion, and the number of interconnected devices will reach 26 billion. In developed markets, the resulting opportunity is largely about making access to the Internet faster, more ubiquitous, and cheaper; the recent rollout of high-speed broadband service Google Fiber in Austin and Kansas City in the U.S. is one such example. High-speed broadband also supports the growth of "smart cities" that focus on the intelligent application of information and communication technology. For instance, the city of Bristol, England is spending $120 million on laying superfast, high-capacity fiber-optic cable to spur research, innovation, and entrepreneurial ventures in high-tech fields.

In emerging markets, the investment opportunity arises as cities get hooked into the online grid, an increasingly critical determinant of a city's success given the growing need to be integrated into the global flow of information. Emerging markets will see the largest growth in new Internet users — less than 10% of India's 1.2 billion population currently has access to the Internet, for instance — and new infrastructure will be required to support them. Since emerging-market cities often lack fixed-line infrastructure, they employ mobile broadband technologies to deliver high-speed Internet access to users. An estimated 1.7 billion smart phones will be sold in 2017 alone, with 60% of those sales happening in Asia.

As a result, a growing global opportunity exists for both public and direct private investments in IT infrastructure, broadband, data centers, and cell towers. In the U.S., for example, cell tower investments have been successfully executed through both securitizations in the asset-backed securities market and leasebacks from real estate investment trusts. In the U.K., cell tower investment opportunities are accessible through investment in the wireless carriers themselves. There are also a range of specialized REITs focused on data centers. In evaluating the broad range of opportunities, investors must consider the risks associated with the rapid pace of technological change — namely, which technologies will become obsolete and which will be widely adopted and thrive.

Mega-city connectivity

With the number of cities poised to expand dramatically over the next two decades (more than 650 cities will have populations of at least one million by 2030), we believe major world regions will employ a "hub and spoke" model of connectivity. The "hubs" will be the gateway cities of five million-plus people, of which there will be more than 100 worldwide by 2030. To this end, emerging markets such as Indonesia, China, and India are now investing heavily to improve their airports, roads, and high-speed rail to link their major cities together. For example, Mumbai's vast new airport will be able to accommodate 40 million passengers per year when it is fully completed in 2015. Similarly, talks are ongoing for the expansion of London's Heathrow airport, which is currently operating at near-full flight capacity.

For investors, the opportunity to participate in mega-city connectivity projects will continue to materialize over the next decade as existing mega-cities hit transportation capacity constraints — for example, the new airports and longer runways currently planned in Sydney and London's Gatwick — and as new cities in emerging Asia reach "hub" size. Many of these opportunities will come in the form of public-private partnerships. The Indian government, for example, has recently announced public-private partnerships to build 200 low-cost airports over the next 20 years to connect smaller and mid-sized cities with major regional hubs, alongside a planned government investment of $120 billion to improve air connectivity across the country over that same time frame. Istanbul is currently planning its third international airport, slated to be the world's largest, with a

Exhibit 10

Investment opportunities in urban infrastructure

WIRED CITIES

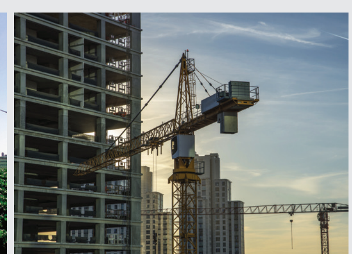
IT infrastructure, data centers, cell towers, and broadband

MEGA-CITY CONNECTIVITY

Expansion of primary airports, major seaports, and high-speed inter-city rail to connect major regional gateways

ANTI-POLLUTION

Solutions to increasing levels of air and water pollution, especially in emerging-market cities



REPLACING AND IMPROVING OLD ASSETS

Renovation, reconstruction, and expansion of infrastructure in the developed world and other mature cities projected annual passenger capacity of 150 million. In Canada, the government has established a separate entity to promote public-private partnerships that include transit facility renovation in Ontario and a new light rail system in Alberta.

In Europe, meanwhile, the rail system Eurostar is jointly operated by the national railway companies of France, Belgium, and the U.K.; the British government recently announced that it would aim to sell its 40% stake in the company. A potential future high-speed rail line, High Speed Two, extending the Eurostar is also under development and is likely to create additional private-sector investment opportunities along the rail infrastructure supply chain. Other opportunities will come in the form of privatizations, the approach taken for U.K. airports, including London's Gatwick and Heathrow, with the passage of the Airports Act in 1986. Regardless of ultimate structure, though, investment opportunities linking gateway cities with each other and with emerging urban locations are likely to be worthwhile infrastructure investment ideas for institutional investors to explore.

Anti-pollution

About half of the world's urban population is exposed to air pollution that is at least two-and-a-half times higher than the levels recommended by the World Health Organization. The issue is acute in China, which is currently home to 16 of the 20 most polluted cities globally. In 2014, Premier Li Keqiang announced that China would "declare war" on pollution and unveiled new measures aimed at thwarting the problem. Among other things, he pledged further development of nuclear power and renewable energy and support for green and low-carbon technologies. The Chinese government announced a prohibition on new coal-fired power plants around Beijing, Shanghai, and Guangzhou and also announced a ban on all coal use in the Beijing area by 2020. As a result, renewable energy, including natural gas and wind power, will likely present a major infrastructure opportunity for investors in the region. The focus on controlling pollution extends beyond China, though. For example, efforts in developed countries have focused on increasing the share of urban waste that is recycled, with the European Union recently proposing a recycling target of 70% of urban waste and 80% of packaging waste by 2030.

Water treatment is also an area of increasing concern, especially in emerging markets. For instance, India currently has the capacity to treat only about 30% of the household waste it produces, according to its Central Pollution Control Board; the rest goes into open drains or into the ground, creating a significant public health hazard. Substantial investments in landfills, incineration, and recycling will be required to address this pressing issue. Financing water infrastructure and wastewater treatment is also a potentially significant investment opportunity in the developed world. In the U.S., for example, public-private partnerships, though politically complex, have supported the maintenance and capital improvement efforts of water systems in Bayonne, New Jersey and Rialto, California. Outside of the U.S., the privatization of water infrastructure is more widespread. In the U.K., many of the major water systems have been privatized, including London's Thames Water, which was acquired by a large infrastructure fund. And in Australia — where water scarcity is a major area of concern — desalination infrastructure for Sydney is operated under a lease held by a major pension plan alongside an asset manager; similarly, the Victorian Government offered a 30-year concession in 2009 for a Melbourne desalination facility. Of course, some of these investment opportunities can only be accessed through direct private equity or debt investments, but others are also accessible through publicly listed companies and funds that are focused on renewable energy and water infrastructure.

Replacing and improving old assets

Both developed-market and mature emerging-market cities need to replace degrading infrastructure. For instance, the American Society of Civil Engineers recently gave a D+ grade to the nation's transportation, water, energy grid, and public facilities and estimated that $3.6 trillion must be spent by 2020 to prevent major structural problems. A similar story is playing out in cities across Canada, Europe, and Latin America. In Rio de Janeiro, for instance, spending on infrastructure related to the 2014 World Cup and 2016 Olympic Games is projected to top $11 billion. In New York City, spending required to repair decaying infrastructure — including sewer mains, gas lines, and bridges — is estimated to reach close to $50 billion through 2030.

Infrastructure replacement across many major cities is urgently required now. This was vividly illustrated in the summer of 2014, when 20 million gallons of water shot out of a ruptured pipeline in Los Angeles, causing extensive flooding and property damage. Investable opportunities include the renovation, reconstruction, and expansion of pipes and utilities, bridges, toll roads, parking areas, rapid-transit bus and metro-rail lines, and hospitals.

Despite the urgent need for infrastructure upgrades, it is harder to participate in this opportunity in the U.S. While the municipal bond market provides access to infrastructure investments in certain localities, there is a very limited supply of public-private partnerships in U.S. airports and railroads, with some opportunities existing in ports and toll roads, including new managed lanes toll roads in Texas and the operation of the Capital Beltway in Washington, D.C. One potential path forward is exemplified by the public-private partnership for the Central Terminal Building at La Guardia Airport in New York City. The deal allows for private investors to participate in the upgrading of the Central Terminal facilities without the political complexity of entering a public-private partnership for the entire airport.

In contrast to the limited U.S. supply set, select opportunities exist in Europe, Canada, and Latin America. These opportunities may be accessible through public-private partnerships, where governments are willing to grant concessions to companies to operate and manage these assets for a set duration. In other situations, these assets may be privatized, allowing for direct ownership. For example, in Brazil, many major airports have been privatized, and in Spain, a public offering for a stake in the national airport operator is being planned; in Chile, Santiago's international airport is managed and operated via a concession by a consortium of private companies.

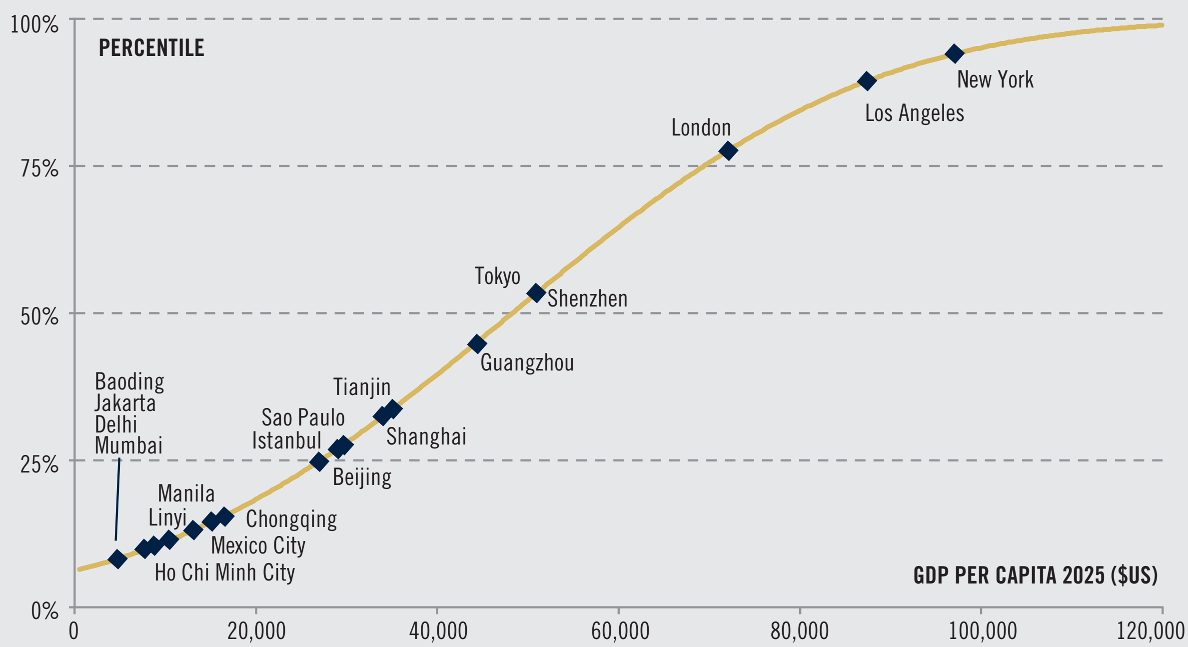
2. Real Estate

Real estate investment opportunities will differ based on where a city currently sits in its development trajectory (Exhibit 11). In general, the early-stage emerging-market story is largely about economical housing and basic levels of consumer spending, as most city-dwellers are just now amassing enough money to spend on things other than their daily subsistence. In more developed markets, the real estate opportunity is about the lifestyle trend of living in the urban core. Across both of these markets, we view three investment opportunities as especially appealing (Exhibit 12).

Exhibit 11

A city's stage of development helps assess real estate investment opportunities

Forecasted Metro Area GDP Per Capita - 2025



EMERGING ECONOMIES
"Basic Needs"

- Residential
- Retail

MATURING ECONOMIES
"Development"

- Retail
- Office
- Logistics
- Residential

DEVELOPED ECONOMIES
"Services Economy"

- Office
- Retail
- Residential

Source: Oxford Economics; PGIM Real Estate

Urban revival

Many developed-market cities in the U.S. and U.K. are now undergoing significant revivals, with people and companies alike increasingly attracted to the urban lifestyle. In the U.S., this trend is associated with the migration of skilled, higher-wage earners back to the urban core; in the U.K., it is linked to the revitalization of cities such as Birmingham and Manchester that had lost some of their luster due to shifts in industrial activity. This urban rebirth has created a need for conversion and re-purposing of downtown real estate into mixed-use development, including residences and commercial space. For younger generations, a community-oriented, urban setting is part of the desired millennial lifestyle of easy access to the important aspects of professional and personal life, including public transportation for commuting from the home to work and to social outings. Downtowns in cities such as Atlanta, Charlotte, and Raleigh are becoming more like the dense urban cores that have long existed in New York City or San Francisco. Downsizing "empty nesters" and retirees, for their part, want to leave the suburbs and enjoy the amenities of city living, experiencing arts, culture, dining, shopping, and green spaces all within close proximity of home. Cities such as Fort Lauderdale and Plantation in Florida are examples of communities that offer these types of benefits to older generations. "Live, work, play" is the oft-used theme supporting mixed-use development incorporating downtown residences and office spaces.

Exhibit 12

Investment opportunities in real estate

URBAN REVIVAL

Conversion or re-purposing of existing downtown real estate into mixed use, urban livability, and commercial space to support the re-birth of the urban core

ECONOMICAL HOUSING OPTIONS

Workforce and affordable housing in early-stage emerging-market cities, a critical factor for a city's initial success

RETAIL OUTLETS AND LOGISTICS SUPPORT

Shopping experiences for new urban consumers, especially as small and medium sized emerging-market cities reach critical mass; logistics and warehousing to support global e-commerce growth

In cities where downtown utilization is high, these can be highly attractive real estate investments, often involving minimal construction or development risk (in many cases, the units already exist and may just need to be converted for new or additional uses), with investors being able to readily ascertain the rental income that will be generated. For example, younger generations may be highly attracted to urban loft-style living, with shopping and other retail opportunities located on the ground floor, as it allows them to conduct many of their personal activities close to home. Baby boomers may look to condominium communities that will cater to needs and services they may require, while also affording them the energy of an urban environment. These older generations may require larger accommodations in line with their level of affluence, and there has been a trend towards renting versus owning these "later-in-life" homes due to a desire for flexibility. Furthermore, if investors are able to successfully pick cities at the cusp of an economic revival, they can benefit from potentially attractive yields compared to major established cities, in large part due to the perceived illiquidity or "take off" risk implicit in those higher yields.

Economical housing options

In early-stage emerging markets, affordable housing is a critical factor for ensuring a city's initial success; if individuals are not able to acquire shelter in permanent and durable structures, cities cannot progress economically and will remain depressed. But housing is becoming increasingly more costly due to the combination of rapid urban growth and a dearth of existing supply. According to the World Bank, a shortfall of 35 million housing units currently exists in major emerging markets, equating to about $700 billion in total value.

Economical housing (multi-family units and rental apartments) is particularly needed in emerging-market cities with large middle-income and lower-middle-income populations, but also in developed markets — this type of workforce housing allows essential public servants such as police officers, EMTs, and teachers to live in the communities in which they work and helps to propel a city along its development trajectory. "IKEA-style" housing — cheap, efficient, and durable — is crucial in supporting a new and fast-growing urban population, and there is a developing trend to aggregate larger amounts of these affordable units together for investment. These types of affordable housing options, including government-sponsored but privately-owned projects, offer significant near-term opportunities for investors.

Retail outlets and logistics support

This opportunity is based on the one billion new urban middle-class consumers in emerging markets, who now have money to spend on retail purchases. Cities will require more shopping malls and retail outlets of all types to cater to this burgeoning urban corps of shoppers, creating commercial real estate opportunities in many parts of the emerging world. In Colombia, for example, 47 new malls will be opened and 15 remodeled by 2015, requiring a total investment of more than $2.2 billion. Vehicles focused on direct investment opportunities in retail outlets can be geographically diversified, giving exposure to different cities while capitalizing on the overall retail boom in emerging markets.

This is also a logistics opportunity driven by global e-commerce growth that is forecasted to reach $2.3 trillion by 2017, which will require more warehouses and logistics facilities to store and transport the purchase and sale of goods. As the number of online merchants and smaller-format stores grows, more businesses will require logistics support to enable their operations. In a world no longer purely dominated by large, brick-and-mortar retailers, the presence of efficient logistics networks allows for goods to be transported in an on-demand manner from manufacturer to store (or directly to the consumer) without taking up valuable shelf or storeroom space for extended periods of time.

Amazon alone has spent $14 billion on fulfillment and the building of 50 new facilities since 2010. Rival Alibaba announced in 2013 that it would be leading a consortium of investors who will spend $16 billion on building a national logistics business in China. In Saudi Arabia, meanwhile, the public-private King Abdullah Economic City development — the world's first publicly-listed city — was established in 2006. The city's King Abdullah Port, which began operating in 2014, aims to be a global logistics hub. Similar to the retail investment trend, there may be an opportunity to invest directly in logistics facilities with broad exposure to different geographies, based on where the logistics facilities are situated and the regions they support.

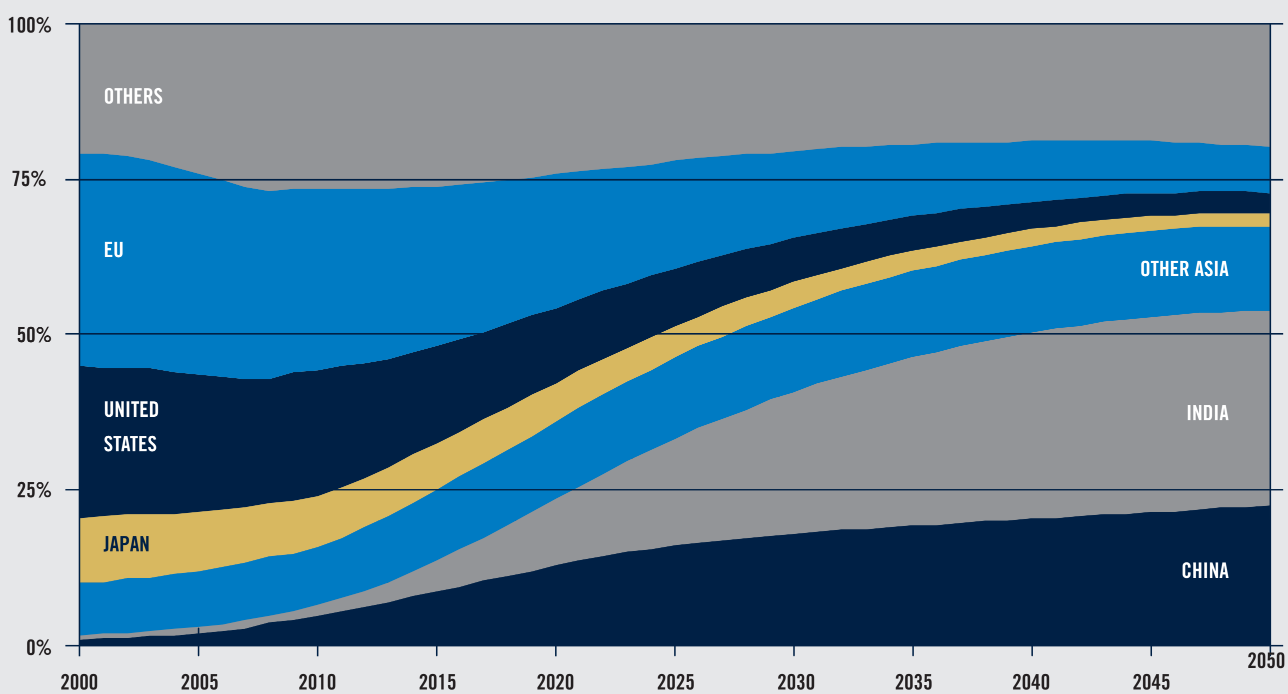
3. Consumer Goods and Services

Thanks largely to the wealth creation brought about by urban expansion, the emergence of an entirely new cohort of urban middle-class consumers is having significant ramifications for the global economy and companies around the world. In particular, global middle-class consumption will shift heavily towards cities in China, India, and other emerging Asian countries, as developed countries see their share decrease, according to Homi Kharas at the Brookings Institution (Exhibit 13).[12] In China, middle-class spending could hit $4.5 trillion annually by 2020, triple the level in 2010. India could see a six-fold leap in annual middle-class spending, to $3.7 trillion, over that same time frame.

Exhibit 13

Global middle-class consumption will shift heavily towards Asia over the next 10 years, fueled by urbanization

Percentage share of global middle-class consumption



Source: Kharas, H., "The Emerging Middle Class in Developing Countries"

Similar to real estate, investors can think of cities along a development trajectory when it comes to the consumer goods and services that might merit special focus. Examining the wealth prospects of a city in its entirety can shed insights into the spending level a particular city offers its residents — and what this means for the products and services those residents can afford, usually for the first time (Exhibit 14). For example, in emerging cities like Jakarta and Kolkata, new arrivals from rural areas can afford processed food or very small quantities of basic necessities like shampoo. Once an emerging city becomes richer, residents can step up their consumption through items such as fast food and beauty products. Clearly, the hundreds of large cities around the world vary enormously in their attractiveness for consumer goods and services companies. Within the overall consumer goods and services theme, we believe two investment opportunities are particularly attractive (Exhibit 15).

New consumer class

One billion emerging-market consumers will be joining the middle class by 2025, and as their purchasing power grows, these consumers will have similar needs as their counterparts in the developed world. For example, consumers in the growing middle class will increasingly require financial services such as mortgage lending. Domestic airlines catering to vacationing middle-class residents in India and other emerging markets are now seeing a surge in demand. Private-sector education providers in cities like Shanghai and Bangalore are likewise experiencing a growing uptick for their services. And companies supplying new middle-class urbanites with durable goods such as household appliances and consumables like beer, wine, and fast foods are seeing their sales rise sharply in emerging markets.

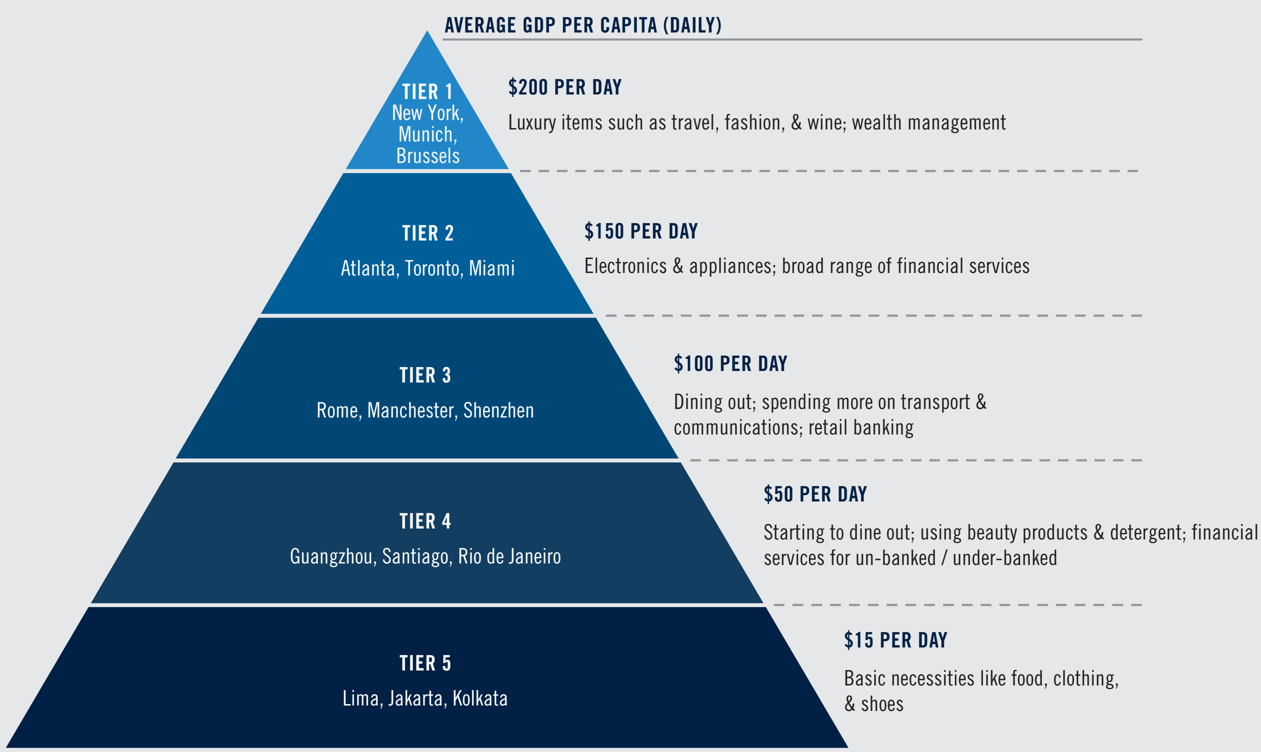
All of these provide potentially attractive investment opportunities that can be accessed via public market investments in a diversified suite of consumer-oriented companies that are focused on emerging-market cities or broader sectoral bets if specific theses are examined around one area of consumer goods or services over another. Similarly, direct stakes in companies through private investment are possible for more focused opportunities.

Global luxury

The global luxury market is growing at double the rate of the overall global economy and is forecast to reach $325 billion annually by 2015. Individuals living in high-GDP-growth emerging-market cities will increasingly aspire to live and consume like affluent consumers in developed markets. Indeed, Chinese consumers were the world's biggest buyers of luxury goods in 2012, according to McKinsey.[13] And sales of luxury cars in Brazil are growing at a 45% annual clip. Companies that offer high-end hotel and travel services, hard luxury (such as watches and jewelry), and fashion items are finding robust demand in cities like Dubai, Beijing, and Singapore.

Exhibit 14

Consumer needs may be tied to the wealth prospects of a particular city



Source: World Bank – Global Consumption Database; McKinsey Global Institute

Exhibit 15

Investment ideas in consumer goods & services and the agriculture supply chain

Consumer Goods & Services

NEW CONSUMER CLASS

Needs of new emerging-market middle class consumers seeking durable goods, consumer finance, fast food, education, and other items and services

GLOBAL LUXURY

Demand for luxury brands, high-end hotels and travel services, hard luxury, and collectibles in high GDP-growth emerging-market cities

Agriculture Supply Chain

INDUSTRIALIZED AGRICULTURE

Machinery and agricultural technology required as rural Asia and Africa transition from small-scale, labor-intensive farming to large-scale, capital-intensive farming

4. Agriculture Supply Chain

Given the explosive growth of middle-class consumers around the world, the demand for food — particularly meat and dairy — will escalate sharply over the coming decades. According to the United Nations Food and Agriculture Organization, the world will need to produce 70% more food by 2050. But urban expansion will potentially reduce the rural population by up to 200 million people over that same time frame — and possibly by over one billion people by the end of this century.

The upshot: to achieve sufficient increases in food production, despite a potentially smaller rural workforce, the agricultural sector will need to modernize. While forecasting future food production patterns is tricky, the most likely path is that agriculture in Africa and Asia will increasingly be modeled on farming patterns in the Americas and Australia. The de-population of rural Asian and African markets will create a major impetus for a shift from labor-intensive, small-scale family farming to capital-intensive, large-scale industrialized farming. This shift will likely also include improved transportation infrastructure, innovation in food design (driven by private companies and universities), and expertise in dealing with price volatility. Farmers and governments alike will need to think of more innovative and sustainable production methods, and governments will need to balance protectionism with the need for an efficient agricultural supply chain. Driven by this expected agricultural transformation, we believe one investment thesis — industrialized agriculture — is particularly attractive (Exhibit 15).

Industrialized agriculture

Because fewer people will be available to farm while food demand will continue to climb, agriculture in Asian and African developing countries will likely become significantly more capital intensive and resemble the larger, industrialized farms of North America, South America, and Australia. Closely related to a more capital-intensive farming model will be the need to evaluate and potentially adopt a range of less prevalent farming technologies, including genetically modified crops, fertilizers, and pesticides. Clearly this potential agrarian transformation will come with a host of complex but important policy issues, including the impact of larger land holdings on asset and income equality, and the longer-term environmental and health consequences of new farming technologies.

However, if Asian and African farming does follow this trajectory, we believe there will be significant investment opportunities in both global and Asian and African companies that focus on providing farming machinery as well as next-generation farming technology. Investment opportunities may also exist in large-scale land acquisitions, through purchasing and combining smaller tracts of land to make farming more efficient than the small-scale farms that predominate in many Asian and African economies today. The trend towards large land transactions is already evident with the International Land Coalition identifying over 250 recent land deals across food, bio-fuel, and livestock in 27 countries for over 50 million hectares, with investors comprising governments, sovereign funds, private-sector companies, and asset management funds.

It is also worth noting that increasing the amount of food required to feed a growing population is not just a matter of ramping up production. Food must also be distributed much more efficiently: about 25% to 30% of all food is currently wasted due to a lack of adequate transportation and storage, according to the United Nations Food and Agriculture Organization. Although still uncertain, longer-term investment opportunities are likely to arise from the new or expanded corridors of food supply from the farm to the urban dining table. These include direct or indirect investments in processing and storage facilities as well as transportation networks along new corridors of international food demand.

When, Where and How To Invest

While the evaluation of specific investments depends on the unique objectives of each investor, we believe the 10 investable ideas outlined above present attractive opportunities across both emerging and developed markets. In addition to where these ideas may present themselves, we also believe there is an equally important time dimension of when an opportunity needs to be examined and evaluated: many of the ideas discussed could be most opportune at specific times in a city's development cycle or trajectory (Exhibit 16).

For instance, opportunities such as ensuring affordable housing options or addressing pollution issues are most important when a city is growing. Other ideas, such as capitalizing on consumers' growing interest in luxury goods, will only be at their "prime" when a city is more established. And opportunities tied to the agriculture supply chain may not reach their peak until a city has matured as a well-integrated player in the global flow of trade. It is also important to note that regardless of their location in emerging or developed markets, cities may fall into a variety of stages along the development cycle. For example, a city in the developed world that is currently undergoing a revival and transformation is in a growth stage versus being established or mature.

The investment ideas could be also accessible across a broad range of public and private vehicles and asset classes, demonstrating the wide-ranging impact of the urban expansion trend (Exhibit 17).

Exhibit 16

Summary of investment ideas: where and when to invest

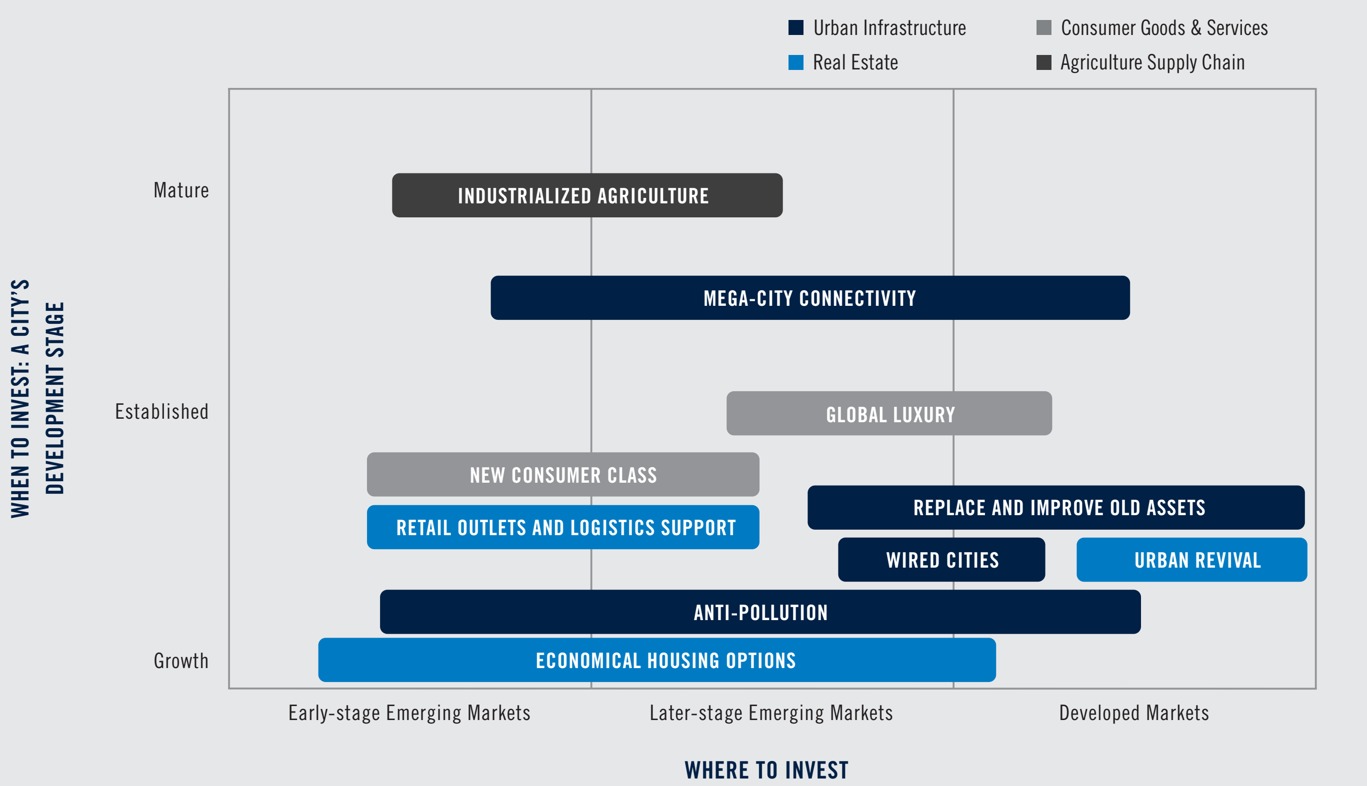


Exhibit 17

Summary of investment ideas: primary ways to access

INVESTMENT IDEAS		ASSET CLASS								
		Public Equity	Public Debt	Private Equity	Private Debt	Real Estate Equity	Real Estate Debt	REITs	Public-Private Partnerships	Privatization
Urban Infrastructure	Wired Cities	✓	✓	✓	✓					
	Mega-city Connectivity	✓	✓	✓	✓				✓	✓
	Anti-pollution	✓	✓	✓	✓					
	Replace and Improve Old Assets	✓	✓	✓	✓				✓	✓
Real Estate	Urban Revival					✓	✓	✓		
	Retail Outlets and Logistics Support					✓	✓	✓		
	Economical Housing Options					✓	✓		✓	
Consumer Goods & Services	New Consumer Class	✓	✓	✓	✓					
	Global Luxury	✓	✓	✓	✓					
Agriculture Supply Chain	Industrialized Agriculture	✓	✓	✓	✓					

Applying A City-Level Lens Across The Investment Portfolio

While the investment opportunities resulting from the urbanization boom lead to a range of potentially attractive ideas across a number of asset classes, institutional investors may also be able to act on this mega-trend at the portfolio level. To do this, CIOs will have to consider both their optimal organization structures and the analytic opportunities afforded by increasingly richer, more accurate, and more accessible city-level data.

Organizing to capture the urbanization mega-trend

Though some institutional investors have accessed cross-asset class themes — such as inflation — through dedicated investment sleeves, many institutions are not managerially or organizationally structured to implement investment ideas that are broad, thematic, and cross-asset class. While the typical targeted, asset-class specific structure has served organizations well, CIOs may find it worthwhile to consider additional actions aimed at capturing broader, thematic mega-trends such as urbanization. As an example, those actions might include:

- Considering the creation of an urbanization task force to examine the investment implications of new city formation and urban expansion.
- Evaluating whether a thematically-focused, multi-asset class investment sleeve can serve as a complement to traditional asset-class focused sleeves.
- Examining whether restrictions on investment structures or limits on risk exposures might constrain the organization's ability to participate in the urbanization opportunity.
- Exploring potential opportunities to enter into targeted strategic partnerships with third-party asset managers, investment consultants, or strategy consultants to invest in the urbanization mega-trend. Or, one step short of that, incorporating a discussion on the urbanization mega-trend into the formal dialog with counterparties.
- Determining which investments in incremental data and analytics might be helpful to fully evaluate city-level opportunities and risks resulting from urban expansion.

Near- and long-term considerations for urban investment analysis

Most institutional investors already have a fairly robust understanding of country-level exposures, aggregated across both internally managed and externally advised portfolios. For those investors wanting to dig deeper into city-level opportunities and risks across their assets, an increasingly rich array of city-level data can now be accessed, though it is admittedly nowhere near as rich or complete as country-level data.

In the near-term, investors should consider (where possible) which components of their overall investment portfolios are positioned to take advantage of the investment opportunities arising from urban expansion and which sectors and investment theses are at risk given the pace and scale of urban expansion. Over time, this evaluation can help reposition the portfolio to be on the "right side" of the urbanization mega-trend.

Investors may also utilize city-level data to identify and prioritize a range of current investment opportunities. This could involve incorporating a variety of city-level lenses to provide valuable additional input in evaluating direct real estate and direct infrastructure or even public debt and equity securities investments with a high city concentration. For example, city-level data could be analyzed and weighted to create an "urban opportunity index" that incorporates forward-looking indicators of economic success, a scorecard for city-level innovation that helps assess venture and technology-oriented investments, and an index of cities at potential economic risk to complement more traditional metrics and analyses used to assess investment opportunities (Exhibit 18). Although it may not be possible today to analyze these kinds of city-level opportunities and risks across the entire investment portfolio, institutional investors can continue to push data providers, asset managers, and public companies to provide more complete and robust exposures around their city-level exposures.

Over the long-term, as the availability of city-level data continues to improve, investors will be able to move beyond the broad buckets of developed, emerging, and frontier markets — and even beyond country-level exposures — to be more city-specific in their review of investment opportunities. Applying a "city lens" to investment portfolios can reveal a number of actionable insights and broaden the universe of investment opportunities. And a more granular understanding of city exposures can alter decision making around risk-return trade-offs. Having broad exposure to China or India, for example, is very different than having specific exposure to Shanghai or Bangalore.

Exhibit 18

Analyzing city-level data may help identify target cities for a variety of investor objectives

ILLUSTRATIVE GROUPINGS		
ECONOMICALLY SUCCESSFUL	**INNOVATIVE**	**POTENTIALLY AT RISK**
1. Kuala Lumpur, Malaysia	1. Boston, USA	1. Nairobi, Kenya
2. Taipei, Taiwan	2. San Francisco, USA	2. Lagos, Nigeria
3. Singapore, Singapore	3. Beijing, China	3. Dhaka, Bangladesh
4. Hong Kong, SAR, China	4. Stockholm, Sweden	4. Karachi, Pakistan
5. New York, USA	5. London, UK	5. Ho Chi Minh City, Vietnam
METHODOLOGY / WEIGHTING		
25% Equal weightings of: • City population growth rate, 2015-20[1] • City real GDP growth rate, 2015-20[2] • Count of office locations of global firms[3] • Competitiveness Index[4]	20% Equal weightings of: • City population growth rate, 2015-20[1] • City real GDP growth rate, 2015-20[2] • Livability Index[4] • Innovation Index[5] • Knowledge Index[6]	20% Equal weightings of: • City population growth rate, 2015-20[1] (high growth) • City real GDP growth rate, 2015-20[2] (low growth) • Livability Index[4] (low score) • Competitiveness Index[4] (low score) • City Crime Index[5] (high score)

Source: 1. United Nations; 2. Oxford Economics; 3. Globalization and World Cities Research Network; 4. The Economist Intelligence Unit; 5. 2thinknow; 6. Centre for International Competitiveness

The mega-trend of urban expansion opens up important new investment opportunities for institutional investors. But just as the current pace of urban population growth has never been seen before, it will likely never be repeated again. In 30 years' time, the urban story will still continue, but the rate of change will taper off — as will the investment opportunities resulting from urban expansion. Investors should consider capitalizing on the opportunities now arising from this unprecedented population shift.

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