

Abu Dhabi
Beijing
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Buenos Aires
Chicago

Hong Kong
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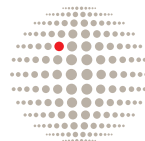
Madrid
Mexico City
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Moscow
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New York
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São Paulo
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Shanghai

Singapore
Stockholm
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Tokyo
Toronto



Cities of Opportunity



Partnership for New York City

Looking to the future of 27 cities at the center of the world economy

In this fifth edition of *Cities of Opportunity*, PwC and the Partnership for New York City again examine the current social and economic performance of the world's leading cities. We also add a future dimension that probes the shape of city economies to come. Together, looking at 2012 results and ahead toward the possibilities in 2025, we seek to provide a realistic framework for thought and action beginning with 27 of the world's most significant cities—on one hand, the engine of the modern global economy and on the other, the heart of much of our shared culture.

It is precisely because of the importance of cities and the need to deepen knowledge of urban issues that we undertake the study. The effort to question and understand where cities are and where they are headed benefits all of us in a world urbanizing like never before. This includes the officials and policymakers setting the course, businesses invested in city well-being, and the citizens who build their lives in thousands of city neighborhoods worldwide, rich or poor, picturesque or prosaic.

Statistics tell some of the story: Today, our 27 cities account for nearly 8 percent of world gross domestic product (GDP) but only

2.5 percent of the population. By the quarter-century, they will house 19 million more residents, produce 13.7 million additional jobs, and generate \$3.3 trillion more in GDP if population follows UN projections and economic progress remains modest. As growth occurs, the symbiotic relationship between East and West is likely to continue: Emerging cities will skyrocket in jobs and population, but developed cities will retain the spending power, as well as the consumer and corporate demand, to drive growth. One side will still need the other to move ahead.

Meantime, our analysis shows that each city represents an economic ecosystem in its own right, built around mutually supportive economic and social strengths as well as an intertwined fabric of jobs—not just the professionals in bright skyscrapers but all those who turn the lights on every morning from retailers and teachers to nurses and cooks, from crime fighters to street cleaners. Maintaining healthy balance is a cornerstone of urban resilience.

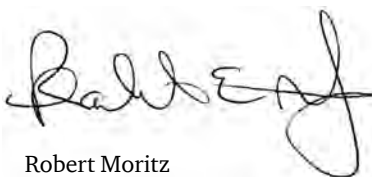
Our jobs analysis also reveals surprising patterns, vulnerabilities, and dependencies, as cities journey toward 2025 with more than a few clouds on the horizon. To come to grips

with some of this uncertainty, “what if” scenarios test the future of our cities under different conditions. The clouds hold silver linings for some cities in terms of greater employment and wealth. But storms roll in for others. The differing “what if” scenarios stress the need for flexible thinking simply to deal with foreseeable changes, not to mention the unexpected turns.

To flesh out the empirical picture, we spoke to a broad scope of leaders on issues from the long range and philosophical to the practical and immediate. This includes E.O. Wilson, the naturalist; Bill Bratton, former New York and Los Angeles head of police; Narayana Murthy, founder of Infosys; Andrew Chan and Peter Chamley, two leaders of the global engineering firm Arup, based in Hong Kong and London, respectively; Wim Elfrink, Cisco's head of Smart + Connected Communities; and David Miller, former Toronto mayor and World Bank special advisor on urban issues.

All in all, we hope to provide insight into an urban world in which all of us are “in it together,” making as strong a case for joint thought and action among cities as there is for self-interest and competition.

Yours sincerely,



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What makes a city tick?

“Justice remains the appropriate name for certain social utilities which are vastly more important, and therefore more absolute and imperative, than any others,” John Stuart Mill wrote in *Utilitarianism* in 1861. He added, “education and opinion, which have so vast a power over human character, should so use that power to establish in the mind of every individual an indissoluble association between his own happiness and the good of the whole.” Many of those we spoke with this year in developing *Cities of Opportunity* agree. The foundations of healthy cities remain rule of law and safety and security today, as well as strong education to foster those qualities for future generations.

Overview

10 How the cities rank

London moves up, Asian cities improve

14 The study’s methodology

Refinements continue on a solid foundation



16

The city tomorrow

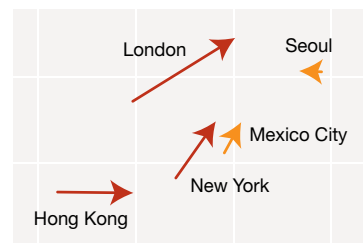
Projecting urban possibilities to 2025

19 From butcher to baker to memory-stick maker

Projecting urban trends to 2025 in jobs, production, and population

22 The shape of city economies to come

Mutual self-interest unites developed and developing cities



23

24 The ants, the man, and the city

E.O. Wilson views city life through the lenses of nature and reason

28 The 2025 baseline scenario

Jobs in business services, wholesale and retail, and manufacturing anchor the cities



24

“We’re quickly coming to an agreement as a nation and as a world—that we really have to improve education systems. We need far better methods of teaching. We need better incentives for teachers, and especially to include education in science and technology because we are now entering a techno-scientific world.”

30 Where the jobs are

A detailed look at six big or telling employment sectors

34 “What if” technological unemployment dawns

... in a slow growth, urbanized world? And four other scenarios that explore unexpected directions

The city today
Results for 2012

42
Intellectual capital and innovation

Generating the skills that generate growth

44
City gateway

A new indicator measures a city's global connections

46
Booting up holistic sustainability

Wim Elfrink discusses Cisco's and his own passage to urban India

50
Technology readiness

The competition for digital advantage continues to intensify

51
Health, safety and security

From Aristotle to Bratton to Chan, securing citizens' well-being is key

52
Bill Bratton transformed urban law and order

... in New York and Los Angeles and explains how to achieve that fundamental priority on the toughest city streets

56
Transportation and infrastructure

A major revision focuses on internal mobility

58
The ins and outs, overs and unders, of a great city

... can be engineered for efficiency, Peter Chamley of Arup explains



“The biggest lesson is that you have to think out of the box. You can't think about all these [urban] challenges in a traditional pattern. We can't build cities like we did in the past. A transformational shift has to happen.”



“Health, safety, and security is the number one requirement for a city. If you don't have security, you don't have health and safety, and all the other pillars that support democracy will weaken, including education and the economy. If you have a shaky platform, they are all going to be shaky.”



“What we often lack now are projects having a champion who will get hold of them and make it their sole aim to deliver them.”

The city today
Results for 2012

62
Sustainability and the natural environment

Weighing the effectiveness of public policy

64
Cold comfort comes in Toronto

... from civility and economic balance, former mayor David Miller explains

67
Demographics and livability

We know it when we see it, despite a certain *je ne sais quoi*

68
Andrew Chan of Arup engineers sees emerging cities

... through the prism of resilience and sustainability

72
Economic clout

Asia rises, but we'll always have Paris

74
Ease of doing business

Competitive cities know how to stay competitive

76
Cost

Comparative advantages can keep advanced economies competitive



64

“To understand a city’s quality of life, see if you can walk around at any time of day or night. You don’t want to be walking around a city at 11 at night if it’s not interesting and exciting, and that’s a test of a neighborhood and a city as a whole.”



68

“For the average person in a developing city, the most important factor is safety, health, and security. Efficiency is also important—and that relates to transport or connectivity and how you lay things out through good urban planning. This ability to get around efficiently is probably second in importance only to safety.”

Cities at the edge

Megacities, megachallenges

79 Smaller world, bigger cities

Emerging cities will need to grow, and invest, even more to enhance their citizens' quality of life

83 Forecast of investment spending

... shows tremendous need in emerging megacities



83

84 Narayana Murthy of Infosys links

... India's urban future to the power of private enterprise, leadership, governance, and transparency

88 A tale of three cities

Athens, Dublin, and Dubai weather the Great Recession in different ways



84

“To bring prosperity to the vast majority of Indians, we need to enhance our governance system, enhance our transparency and accountability, combat corruption, and enhance our infrastructure.”

Reference

92 Key to the variables

Understanding the datapoints that underpin the study

On the web

See www.pwc.com/cities for interactive modelers; videos, podcasts, and full-length versions of the interviews; detailed data definitions and sources

“There is terrible corruption and little public security in my city in Bangladesh. ... But what can we do? We are not politicians or powerful people. We just want to survive. ... That's why people come to New York from all over the world. There is law and order.” —New York cab driver

Highlights

Cities of Opportunity 2012 covers a broad range of findings and ideas. Here is a selection of notable ones.

London moves up markedly but New York shows continued strength

London advances four spots from last year to a virtual lock with New York at the top and finishes first in city gateway, a new category that measures international connectivity. New York performs well across the board but wins no individual category, showing diverse strengths. Paris rises four spots to number four this year, coming in first in demographics and livability and narrowly second to London in city gateway, showing that despite the eurozone's continuing economic instability, the long-term investment that builds a great urban center also lends resilience to weather the storms. Overall, relative bands of performance remain similar to 2011.

Beijing and Shanghai advance

The two Chinese cities move to the top 5 in economic clout and city gateway along with London, Paris, and New York. Balanced progress across a range of social and economic indicators represents the next step for Shanghai and Beijing in transforming exceptional growth into sustainable performance at the top tier of world capitals.

A virtuous circle of social and economic strengths

Our thesis remains that a city's healthy growth and long-term resilience depends on "positive reinforcement in the network of economic and social development," to borrow from scientist E.O. Wilson. When great quality-of-life factors like schools, healthcare, housing, and safety are balanced with strong businesses and solid infrastructure, the formula is right to pave city streets with optimism if not yet gold.

"Another factor that makes things hopeful is what chemists call autocatalytic reactions," Wilson adds. "That is, when you get a product created by putting certain ingredients together, the product itself becomes a catalyst. The reaction speeds up and you get more and more products like that, and it just takes off exponentially. You won't get it quite in a social system, but you could get something like it."

If there's bad news for cities it's the same as in science: "One of the hardest things to do sometimes is to get a reaction started."

Size does matter. But is a big city light enough on its feet to dance?

Continuation of the "urban renaissance" is no guarantee in difficult economic times. Uncertainty seems to have replaced the expectation of return to a steady state of economic growth, and signs of potential transformation can be seen in everything from jobs to the weather that greets us every morning. No matter the size, wealth, or advancement of modern cities, flexibility will be the keyword for planners and policymakers considering the future.

It doesn't take a perfect storm to scuttle city futures

Looking at a range of uncertainties, we tested what it would mean for cities if technological, economic, and sociopolitical forces go in the wrong direction and hamper economic health and employment growth between now and 2025—a realistic enough scenario given the stubborn failure of jobs to return and hints of

broad technological transformation replacing workers without the right skills. Not unexpectedly in this "what if" scenario, employment and GDP growth fall across our spectrum of 27 cities. Beijing, Shanghai, and São Paulo lose the most jobs, but London and Tokyo follow close behind, showing that neither developed nor developing cities escape sweeping transformation. London and Sydney sacrifice more annual GDP than any city except Johannesburg—all suggesting the old adage, plan for the best but prepare for the worst.

"What if" smart cities prevail?

The answer is anything but a no-brainer.

London, Tokyo, New York, Seoul, and Paris fare best in employment growth if cities prosper based on knowledge as well as technological and travel connections—seemingly the right stuff for the modern world. Overall, our 27 cities lose 4 million jobs compared to the 2025 baseline projection. Perhaps counter-intuitively, this occurs because greater productivity will cut the need for workers. However, higher trade might reasonably accompany such a scenario and generate even more jobs than productivity shaves away.

If we follow our urban bliss, London and Sydney lie on the yellow brick road

In *Cities of Opportunity*, our measures of health, safety and security, demographics and livability, and sustainability represent a good proxy for quality of life—the urban characteristic for which many professionals and businesses appear to be searching. If that proves correct and more of us follow our urban bliss, London, Sydney, Singapore, Paris, and Berlin benefit the most in terms of jobs gained by 2025; Stockholm the most in terms of additional GDP. Today's developing cities lose the most jobs and wealth.

When it comes to the share of city employment, the biggest gorillas in the room throw their weight around disproportionately (for better or worse)

Financial and business services, manufacturing, wholesale, and retail sectors anchor many city economies in 2012. The first two account for as much as a third of jobs. That includes Shanghai, where one in three workers is in manufacturing, and Milan, Paris, London, Beijing, San Francisco, and Stockholm, where financial and business services predominate.

Wholesale and retail accounts for more than one in five jobs in Hong Kong, Kuala Lumpur, Moscow, Mumbai, Mexico City, and Istanbul.

While these profiles may be changing—for instance, as emerging cities begin to diversify away from reliance on manufacturing—over-dependencies and imbalances can leave cities vulnerable.

Surf (with the pack) or (defend your) turf?

The question of competing or collaborating within and among communities is as old as the seven hills of Rome. Today's cities need to blend some of each strategic outlook into their planning. On one hand, cities can benefit by aligning interests and seeking joint action in a world urbanizing faster and creating more funding needs than cities are empowered to address. Yet, cities are where the buck stops in terms of the need to get results. Competition with other cities, whether for a new factory or new museum, is a fact of life.

As scientist E.O. Wilson told us: “The solution to our problems is not to expect complete harmony among cooperating people, but to realize that group distinctions and group competition and individual-level competition within groups is just the way we are. What we really need to do is try to find ... a harmonious solution. ... It's that ferment of the center, between the two opposing impulses, which

makes us creative.” Cities like San Francisco, with its mutually supportive ties to Silicon Valley, show the dividends of collaboration.

Cities of invention ... or reinvention

History shows the capacity of cities to build from the ground up, as many emerging cities are doing now, and to rebuild from rubble, as many developed cities have done after war. Success comes from collective will and the ability to align economic, governmental, and social forces. Where there's a common will, there's a way forward.

Growing cities with growling appetites for capital investment

To keep up with the great gains in population and employment by quarter-century, some emerging cities will have to invest significantly. Shanghai and Beijing will need to invest what represents 42 percent of their GDP just to satisfy forecast growth from 2012 to 2025. For Mumbai, it's 35 percent. London, by contrast, only requires 17 percent and Stockholm 19 percent to meet the forecast of investment spending relative to growth.

Most happy cities are alike ... but every unhappy city is unhappy in its own way

Athens, Dublin, and Dubai each endured the same economic crisis. But each climbed out of the hole or stayed mired in their problems in their own way—illustrating the extent to which it is more the differences rather than the commonalities that distinguish economic breakdown and recovery in a city.

Make my city healthy, wealthy, and wise (not necessarily in that order)

Most of the leaders we spoke to emphasize the need for a safe and secure city as the keystone of a healthy community. After that, good education is most widely cited as a springboard for future success. In fact, our own *Cities of Opportunity* analyses have shown that good

housing correlates in a highly positive way with the attributes of an economically strong city. They may be cold, dark, or far from the madding crowd, but Stockholm, Toronto, and Sydney again demonstrate balanced success in education and health, safety and security.

Can the champions rest their feats?

The Olympic effort may be ended in London, but cities worldwide require leaders with the vision and drive to realize transformative projects like Baron Haussmann in 19th-century Paris, Daniel Burnham of Chicago at the turn of the 20th century, and Robert Moses in mid-20th century New York. While their programs were sometimes criticized, they “certainly delivered,” to paraphrase Peter Chamley, head of infrastructure at Arup. Many credit Singapore's modern planners with that vision to see and build.

Chamley, for his part, notes a recent triumph in his home city. “The construction industry can look at the Olympics with pride. Wonderful facilities have been delivered very quickly and on budget. ... It has been a great success in regenerating that part of London.” But many other developed and developing cities face high hurdles including bureaucratic delay, political gridlock, and systemic corruption. To recall the principal behind Burnham's legacy, which continues to benefit Chicagoans: “Make no little plans, for they have no magic to stir men's blood. ... Make big plans. Aim high in hope and work.”

Learn more

See www.pwc.com/cities for interactive modelers, videos, podcasts, and full-length versions of the interviews; detailed data definitions and sources.

Overview





A street in the Beaubourg area of Paris as seen from the Pompidou Center.

London moves up overall, Asian cities move ahead in some areas, and the future moves in patterns we seek to understand

A cityless man is like “a solitary piece in checkers,”¹ simply out of the game, Aristotle wrote 2,400 years ago, putting urban life in a clear social context. Then, the *polis* literally meant a free city that made laws, sometimes wars, and on a deeper level signified the communal existence under the rule of morality that only humans are capable of living.² Being a citizen was a badge of honor for the 30,000 or so *politai* among Athens’s 140,000 or so men, women, children, and slaves.

Today many more of us live in cities. Central Athens houses over 1 million people, with about 3.8 million in the metropolitan area. Citizenship embraces more than just men. And the birthplace of democracy is now better known as the epicenter of the eurozone crisis. (See “A tale of three cities,” page 88.)

However, the foundations of urban life remain the same. City dwellers still prize living under the rule of law and strive to develop the richest quality of social and economic life they can. How to govern justly and well—how best to move the city ahead—is still a point of debate. In ancient Greece, Aristotle’s biggest theoretical rival on the topic, Socrates, his immediate forbear and self-described “gadfly” of the state,³ favored governing by expert managers rather than the democratic citizenry he viewed as a herd. Today, political debates around the world appear equally as difficult (often lacking the intellectual rigor Socrates and Aristotle brought to the party).

With that look back for context, *Cities of Opportunity* notably looks ahead this year to frame city futures around probable directions and unforeseen turns in the road at a crucial time. The Great Recession continues to hamper mature city governments. Stubborn joblessness adds a serious problem. Emerging cities are faced with a flood of immigrants and a pressing need to build adequate roads, water, waste, and energy systems, schools,

and hospitals to accommodate growth. Both mature and emerging cities depend on each other to balance their economies. And “only by acknowledging our extreme interdependence will we make the fishbowl effect work for humanity rather than against it,” in the words of Li Congjun, head of China’s official news agency.⁴ Big uncertainties hang over the entire picture from destabilizing climate change to political and social tension to technological transformation. Realistically, continuation of the 20-year “urban renaissance” cannot be taken as any more inevitable than the long climb in house prices that crashed to set off the economic crisis. A considered look at the future is in order.

The report adds an entire section that projects from our 2012 results the sectoral employment, production, and population of our 27 cities in 2025. We examine what might occur if different city characteristics prove more or less important in attracting investment and driving growth, and how cities will be affected if the world economy changes course. We also veer away from our 27-city study group to examine those cities at the

1 *Politics*, I.1.9-10 as translated by I.F. Stone in *The Trial of Socrates*, 1989, Anchor Books, page 98.

2 *The Trial of Socrates*, I.F. Stone translating on page 10 from *Politics* 2.1.9-10, “It is man’s ‘special distinction from other animals that he alone has the perception of good and bad and of the just and the unjust.’ It is this intrinsic sense of justice that gives man his social instinct, his ‘impulse’ as Aristotle calls it, to a social life, and makes man ‘a political animal in a greater measure than any bee or any gregarious animal.’” Interestingly, E.O. Wilson, a renowned scientific observer and thinker today on sociobiology and human nature, parallels Aristotle in speaking to *Cities of Opportunity* (see page 24), as do a range of others we interviewed including ex-New York and Los Angeles head of police Bill Bratton on the primacy of justice in community-building.

3 As related principally by Plato, as well as Xenophon and Aristophanes, in that Socrates left no writings of his own.

4 “Frictions are hardly avoidable, but what’s important is for the two sides to handle their differences through coordination based on equality and mutual understanding. Only by acknowledging our extreme interdependence will we make the fishbowl effect work for humanity rather than against it.” Li Congjun, president of Xinhua News Agency, China’s official press agency, wrote in *The New York Times*, July 18, 2012, in “Rebalancing the Global Economy.”

How the cities rank

fulcrum of change today: first, the megacities mushrooming especially throughout the emerging world; and second, Athens, Dublin, and Dubai, three cities that suffered through and managed the economic crisis, each in its own way.

We chose to extend our investigation into the future because this seems a natural time to stick our finger into the air and gain a sense of the direction of things to come. After decades in which overall growth led to a common, often unspoken expectation of return to healthy economic equilibrium, we're now at a moment when a few trends indicate a change in the norm, if not advancement to a new plateau in the industrial/information revolution. Economic growth remains slow in many places and municipal budgets strained in mature cities. More puzzling, employment refuses to bounce back to anything near levels before the boom years that preceded the Great Recession. Joblessness, especially among the young, persists at high levels. Scientific advances could be playing a role as "technological unemployment" finally dawns long after Keynes coined the term.

Urban immigration levels never known before (certainly not beyond New World melting pots like New York and Chicago or Buenos Aires and São Paulo) threaten the social and political fabric of many cities. When factors like rising income inequality and pervasive social networking are folded in, cities can become a volatile mix. And ultimately, while cities may lack the power or funding of national governments, they are the ones that must act as all these forces play out in their streets, businesses, and homes. As David Miller, former mayor of Toronto, told us, "Mayors often don't have time to wait, and they are very practical. Mayor LaGuardia [of New York in the 1930s] quite famously said 'there is no Republican or Democratic way to pick up garbage.' You become less ideological. ... City governments are good at action."

Positive forces are at work also. These include the upside potential of globalization and the increasing attraction of cities to travelers of all sorts, the expanding growth of urban service sectors supported by rising demand and higher levels of education and training, opportunities to build new or retrofit crumbling, old infrastructures, and, of course,

	Intellectual capital and innovation	Technology readiness	Transportation and infrastructure	Health, safety and security
27 New York	189	91	101	97
26 London	184	79	99	96
25 Toronto	198	66	109	116
24 Paris	194	65	99	89
23 Stockholm	205	89	103	119
22 San Francisco	191	93	92	107
21 Singapore	122	80	114	103
20 Hong Kong	150	71	103	71
19 Chicago	170	81	92	109
18 Tokyo	167	80	107	93
17 Sydney	179	56	66	114
16 Berlin	147	48	95	101
15 Los Angeles	171	79	59	91
14 Seoul	137	96	109	61
13 Madrid	119	44	99	81
12 Milan	131	34	86	95
11 Beijing	82	49	71	35
10 Kuala Lumpur	66	41	80	55
9 Shanghai	99	48	80	38
8 Moscow	109	54	73	19
7 Mexico City	82	24	93	42
6 Abu Dhabi	87	28	89	93
5 Buenos Aires	63	28	93	43
4 Istanbul	45	33	67	24
3 Johannesburg	49	23	32	46
2 São Paulo	60	22	54	16
1 Mumbai	48	27	70	25

the promise that innovation offers in urban clusters. (See *The city tomorrow*, pages 18-39.)

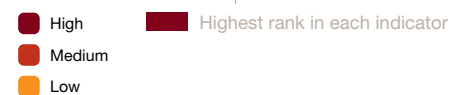
In terms of today, the study finds that despite a revision of many of our data variables and reorganization of indicator categories, relative bands of performance generally continue. Yet noteworthy changes do occur.

London moves up from number six last year, doing very well in many categories and finishing narrowly as the number-two city behind New York. The top third is rounded out by Toronto, Paris, which advances four spots from 2011, Stockholm, San Francisco, Singapore, Hong Kong, and Chicago.

Asian cities perform very well in a number of categories. Shanghai and Beijing move up the ratings, performing in the top five in economic clout and city gateway, the latter a new indicator that measures global attractiveness and accessibility. Four of the five leaders in inner-city transportation and infrastructure sit in Asia—Singapore, Seoul, Tokyo, and Hong Kong—versus last year when all five leaders were in America or Europe. External city connections like air traffic also weighed on the scoring. In demographics and livability, Paris moves up 7 spots from the mid-ranks last year to number one with the indicator category recast in 2012 to stress livability. Paris,

Sustainability and the natural environment	Economic clout	Ease of doing business	Cost	Demographics and livability	City gateway	Score
83	119	182	70	59	121	1,112
65	119	181	71	72	145	1,111
101	98	175	89	75	69	1,096
86	120	137	58	82	143	1,073
88	83	161	86	73	55	1,062
101	76	154	86	76	85	1,061
69	110	202	71	75	99	1,045
59	99	198	78	78	108	1,015
72	67	158	93	67	88	997
58	92	156	51	59	111	974
103	90	147	54	78	77	964
91	68	135	124	74	72	955
79	59	160	99	65	92	954
58	81	146	108	37	82	915
82	76	136	96	55	115	903
89	90	111	71	51	69	827
65	125	80	79	48	135	769
55	64	154	106	53	87	761
44	118	56	83	40	123	729
86	95	62	77	50	87	712
53	60	117	102	43	57	673
33	68	89	90	57	16	650
74	67	60	80	48	41	597
49	61	78	102	34	85	578
55	42	102	100	46	39	534
64	67	88	57	49	50	527
58	82	59	93	23	30	515

Each city's score (here 1,112 to 515) is the sum of its rankings across indicators. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.



London, and New York also narrowly bunch at the top of economic clout between Beijing and Shanghai, first and fifth, respectively.

Our first detailed look at current employment, population, and production in our 27 cities shows them producing 8 percent of the world's wealth in 2012 despite being home to only 2.5 percent of its population. Three major job sectors—business and financial services, wholesale and retail, and manufacturing—dominate many city economies. The latter two categories are particularly large in emerging cities. Business and financial services when grouped together account for over a third

of jobs in Milan, Paris, London, Beijing, San Francisco, and Stockholm. New York leads the world with 16 percent of employment in healthcare. And a third of Shanghai's jobs lie in manufacturing, even as that city is expected to migrate more toward the service sector.

Looking ahead toward 2025, our baseline scenario estimates that an additional 19 million will live and 13.7 million work in our cities. They will generate an additional \$3.3 trillion gross domestic product (GDP)—all predicated on a world of modest growth. Population and employment will surge in cities like Beijing, Shanghai, Mumbai, Istanbul, and São Paulo, with the pack of mature cities far

behind. Yet concentration of wealth reflects the inverse relationship. Among the emerging cities, only Shanghai is expected to reach productivity per worker (as measured by GDP) on a par with mature cities like London, Tokyo, Hong Kong, and Singapore.⁵ The American cities, as well as Paris, Stockholm, Sydney, and Toronto all remain far ahead of emerging ones in terms of wealth. Mature cities retain the spending power, and consumer and corporate demand, that drive emerging economies. In fact, mutual self-interest would logically unite emerging and mature cities as one side continues to need the other.

⁵ Abu Dhabi, an emerging city, is among the overall wealth leaders. But that is driven by the oil economy, hence an anomaly for broad comparison.

Yet visions of the future, like all plans put on paper, are made to be altered by the unforeseen. We questioned what might occur if the urban world takes different turns based on the relative importance of either city characteristics (as represented by our 10 indicator categories) or the direction of the world economy. In looking ahead, we focused on understanding the possible journeys rather than the final destinations to provide leaders in government, business, and the community a pragmatic gauge for their thinking.

“What if” scenarios (see pages 32-38) show that:

- *If cities succeed based on knowledge, technology, and travel connections*, the mature cities—notably London but also Paris, New York, and Tokyo—benefit the most. This is a logical connection in an intertwined urban world: It’s easy to picture the cities that prosper as those with the deepest, broadest, and highest-quality education; those that are “wired” most thoroughly and effectively for businesses and individuals; and those with infrastructures offering easiest access to, from, and for the rest of the world. All these elements are often viewed as leading indicators of urban potential. However, the higher productivity that would likely accompany this reality also depresses overall job numbers. The results brighten notably, though, if 3 percent greater world trade accompanies this scenario, another

logical connection. In that case, employment would rise by 8 million versus the 2025 baseline projection.

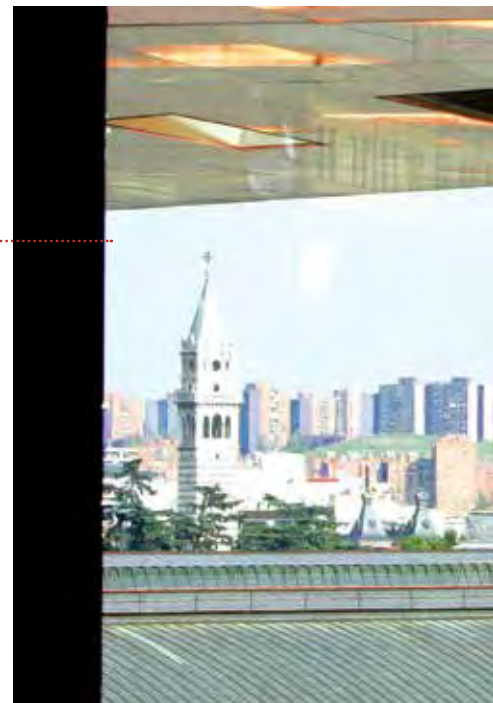
- *If the industrial/information revolution moves in the direction in which it shows signs of going and technological unemployment kicks* into higher gear, all cities suffer losses in jobs and production—which are especially painful set against a background of sluggish economic growth coupled with booming urban populations. Emerging cities do worst in all sectors, with Beijing, Shanghai, and São Paulo losing 2.4 million, 1.9 million, and 1.3 million jobs, respectively, versus the baseline 2025 projection (see chart on page 35). But London and Tokyo also each lose approximately 1.1 million jobs.
- *If protectionism spreads as a way to counter lingering slow growth*, all cities will lose jobs and production, with Beijing, Shanghai, São Paulo, London, and Tokyo again suffering the worst. In fact, the World Trade Organization and European Commission indicate that restrictive trade policies are on the upswing now as nations seek to put their own houses in order at the expense of the outside world.
- *If quality of life drives city economies* as businesses and professionals flock to the most livable cities, London, Sydney, Singapore, and Paris benefit the most.

Cities of Opportunity also ventures beyond the 27 cities in our study to examine cities at the edge of change. First, we look at those emerging giants, the megacities with staggering growth and an equally impressive challenge to develop infrastructure and quality of life at anything near the same speed. The population numbers are impressive, of course. But the direction is more so. In 1950, seven of the 10 largest metropolitan areas were in the developed world. By 2010, only New York and Tokyo remained on the list along with eight developing megacities. European cities had vanished. By 2025, according to the United Nations, the number of megacities (with population over 10 million) will have nearly doubled to 29 from 16 at the turn of the century, with 12 of the 13 new ones in the emerging world. (See page 79, “Megacities, megachallenges.”)

Anyone who has lived in a big city for long, however, knows that things rarely remain the same for more than a few years. For better or worse, change happens.

Athens, Dublin, and Dubai are three cities that dramatically illustrate the toll of the Great Recession and the differing paths to recovery. We wondered what lessons might emerge by comparing them. It turns out that each city followed its own path into the crisis, managed its own way, and dug out or sank in deeper in its own way. Therein lies “a tale of three cities” (see page 88).

Mature cities benefit if future success is based on knowledge, technology, and travel connections or strong quality of life. All cities suffer if technological unemployment or protectionism takes hold in a sluggish economy.



Interviews track the big themes of urban life: the balance required between collaboration and competition; the need for visionary leaders to drive critical transformation; the quest to build a virtuous circle of economic, social, and environmental sustainability; the practical test of how to meet funding needs; and, the foundation of any city, safeguarding justice in the community based on shared respect for law and order and quality of life. We spoke with:

- **E.O. Wilson, the renowned scientist, naturalist, and author, addresses** the potential of cities, good and bad, as they work through humankind's defining challenge of getting the mix right between individual and collective interest. "What we have to do," he argues, "is make cities a lot more livable. By that I mean, more consistent with the fundamental emotional needs, the instinctive needs of human beings."
- **Wim Elfrink, Cisco's chief globalization officer, frames** the transformative possibilities of technology backed up by practical approaches to enable progress, such as public-private partnerships and business consortiums.
- **Bill Bratton, who spearheaded major crime reductions in New York and Los Angeles, tells** how that is done—street by street with respect for citizens' basic quality of life, attention to law and order, and ultimate trust that city dwellers are the ones who will step up to safeguard their own communities.

- **Peter Chamley digs deep into the practical challenges of keeping a mature city up to speed** from his hands-on perspective as chief engineer for Arup Group at London's Crossrail project, New York's Second Avenue Subway, and many other groundbreaking infrastructure initiatives.

- **David Miller, World Bank special advisor on urban issues and former Toronto mayor, speaks of Toronto's ability** to sweeten life for many on the cold shores of Lake Ontario with a recipe that beats hot Tim Horton's coffee and maple sugar donuts, fashioning success from a foundation of economic balance, civility, and social cohesion. Miller also addresses the practicalities of city governance in the face of limited power and funding.

- **Andrew Chan, Hong Kong-based deputy chairman of Arup, dreams of "creating a true eco city** [with] infrastructure that works together in a holistic way so that energy, water, transport, and waste are all integrated." He also tells of some of the biggest urban infrastructure challenges in Asia.

- **Finally, N.R. Narayana Murthy, founder of Infosys and as much a father of India's economic miracle as any business leader, takes a clear-eyed look** at the challenges and opportunities that face a nation urbanizing at the rate of 20,000 new city dwellers a day. "To bring prosperity to the

vast majority of Indians," Murthy counsels, "we need to enhance our governance system, enhance our transparency and accountability, combat corruption, and enhance our infrastructure."

In the end, many implications arise from Cities of Opportunity 2012 for city governments, businesses, and citizens.

Our goal remains helping to identify what works for cities, framing thought and action for leaders charged with public and private decision-making, and, by doing so, bettering the lives of the 3.6 billion or so *politai*, urban citizens representing over half the world's population today.

If there is a lesson to be drawn from the study, it is the continuing demonstration that cities face similar challenges and opportunities, and their intertwined economies depend on each other to prosper. Coordinated dialogue and action around shared goals remain the most effective order of the day in a challenging time.

Learn more

See www.pwc.com/cities for interactive modelers; videos, podcasts, and full-length versions of the interviews; detailed data definitions and sources.



Approach

While the cities and variables may change, the research method remains consistent

It should be clear by now, in this fifth edition of *Cities of Opportunity*, that our annual report is a continually evolving project, in which the only constant is the assurance that both its data and criteria are as tested and unimpeachable as possible, and that sufficient thoughtfulness is invested to make it useful to cities, their leaders, businesses, and citizens seeking to improve their economies and quality of life. No new report is the same as that of the previous year simply because every new report is subject to careful scrutiny and continuing improvement.

An entirely new future-oriented section, *The city tomorrow, is the biggest change* readers will notice this year. We built from a foundation of *Cities of Opportunity* methodology and results, complemented by Oxford Economics's regional and world models, to develop a 2025 baseline projection customized for our 27 cities. From that 2025 baseline, we constructed a “what if” scenario modeling tool sensitive to changes in particular city characteristics as represented by our 10 indicator categories or the world macroeconomic picture. In other words, the modeling tool can reslice the *Cities of Opportunity* urban pie according to the relative importance of city traits that we measure, or it can make the economic pie itself bigger or smaller depending on growth assumptions. Methodology is presented in *The city tomorrow* section (see page 20) along with “what if” scenarios.

Our foundational study of current performance reaches 27 cities this year, up from 11 cities when we began five years ago. But we don't think that the quantity of cities covered is the most important aspect of *Cities of Opportunity*. Rather, it is the quantity and quality of the variables we have added to the study during those years. That is why we

reexamine our methodology every year, and why we try to frame our data within a context that illuminates the meaning behind the raw numbers.

Last year, for example, we explored underlying issues such as regional management, education, cityscapes, sustainability, traffic congestion, and preservation. This year, we are taking an enormous leap forward by projecting our 27 cities 13 years into the future, for indicative forecasts, under several scenarios, of the global urban outlook in 2025. But we also continue to focus on the present: “A tale of three cities” reports on Athens, Dubai, and Dublin, all of which have been deeply affected—each in its own way—by the consequences of the Great Recession.

The fundamental criteria governing this report's choices of cities remain unchanging, however. They are:

Capital market centers. While many of the cities included are hubs of commerce, communications, and culture, all are the financial centers of their respective regions. This means that each plays an important role not only locally but also as a vital part of a global economic network.

Broad geographic sampling. Beyond each city's role as a regional, or even global, center of finance and commerce, the 27 cities collectively form a representative international distribution.

Mature and emerging economies. Fifteen mature cities and 12 emerging ones are included this year, with three new cities added and two removed. At 27 cities, the sample size remains small enough to allow for an analysis that is both deep and broad, but still large—and inclusive—enough to be representative.

This year's total of 27 cities is one more than in last year's report. More important, we have replaced two cities with three new ones: Buenos Aires, Kuala Lumpur, and Milan.

Italy's financial (and fashion) center was added to enhance the geographic weight of Europe's southern tier, to counterbalance the continent's northern cities. Kuala Lumpur joins this year's report because it is, by general consensus, one of Asia's most dynamic capitals and increasingly a major global city. Buenos Aires replaces Santiago in the Spanish-speaking Southern Cone not only because of its economic growth but of its cultural vitality and influence as well. Finally, Houston has been dropped from this year's report in order to more evenly balance the US with the rest of the world.

We have also revised our indicators, dropping one and adding an entirely new one: city gateway. In general, the indicators are constructed with a robust sampling of variables, each of which has been chosen because it is: relevant; consistent across the sample; publicly available and collectible; current; free of skewing from local nuances; and truly reflective of a city's quality or power. (See pages 92-95 for a brief key and www.pwc.com/cities for a detailed listing of definitions and sources.)

Data this year were normalized for factors such as relative geography or population in almost all cases, minimizing the likelihood of a city doing well solely because of size or historic strength. This process eliminated the need to differentiate between variables that reflect a city's raw power (such as number of foreign embassies or greenfield projects) and the quality or intensity of a given characteristic (such as percent of population with higher education).

The 60 variables, down from last year's 66, constituting the 10 indicator groups have changed significantly this year in order to develop an even more accurate image of city success. Indeed, only two indicators—technology readiness and health, safety and security—remain unchanged from the previous year.

The most extensive revisions are in transportation and infrastructure, which has seen its focus sharpened from nine to six variables (of which only three remain the same); demographics and livability, which has been realigned around four variables with the emphasis on livability; and cost, which has four new variables. But there are substantive changes among other indicators as well, including sustainability and the natural environment, economic clout, and ease of doing business.

Because Cities of Opportunity is based on publicly available information supported by extensive research, three main sources are used to collect the relevant data:

Global multilateral development organizations such as the World Bank and International Monetary Fund, **national statistics organizations**, such as UK National Statistics and the US Census Bureau, and **commercial data providers**. The data were collected during the latter half of 2011 and first quarter of 2012. In the majority of cases, the figures used in the study refer to 2010 and 2011 data.

In some cases, national data are used as a proxy for city data. Use of national data tends to disadvantage the 27 cities in our study, all of which are either national or regional capitals of finance and business that tend to outperform national averages in measures

of socioeconomic advancement. This effect might be even more pronounced in developing economies and economies with larger rural populations. Nonetheless, because consistent comparisons across all cities are critical to assure objectivity, country-level data were used when consistent, highly reliable sources of publicly available municipal data could not be used for all 27 cities.

The scoring methodology was developed to ensure transparency and simplicity for readers, as well as comparability across cities. The output makes for a robust set of results and a strong foundation for analysis and discussion.

In attempting to score cities based on relative performance, we decided at the outset of our process that maximum transparency and simplicity required that we avoid overly complicated weightings of our 60 variables. Consequently, each one is treated with equal importance and, thus, weighted equally. This approach makes the study easy to understand and use by business leaders, academics, policymakers, and laypersons alike.

Taking the data for each individual variable, the 27 cities are sorted from the best performing to the worst. The cities are then assigned a score from 27 (best performing) to 1 (worst performing). In the case of a tie, the cities are assigned the same score.

Once all 60 variables are ranked and scored, they are placed into their 10 indicators (for example, ease of doing business or city gateway). Within each group, the variable scores are then summed to produce an overall score for that indicator. This produces 10 indicator league tables that display the relative performance of our 27 cities.

Indicator rankings at a glance

The maps below show city rankings in each of the study's 10 overall indicators. A brief key to the 60 variables is available on pages 92-95. Interactive tools and detailed listings of definitions and source documents used to develop *Cities of Opportunity* are offered at www.pwc.com/cities.

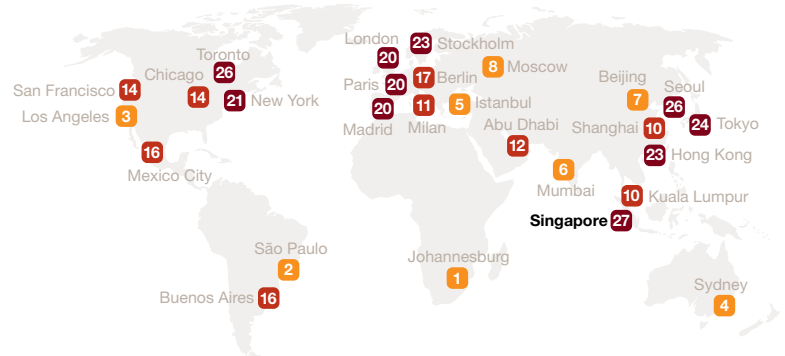
Intellectual capital and innovation
page 42



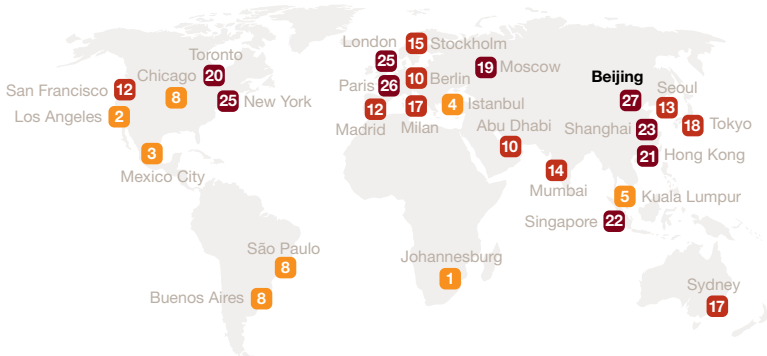
Health, safety and security
page 51



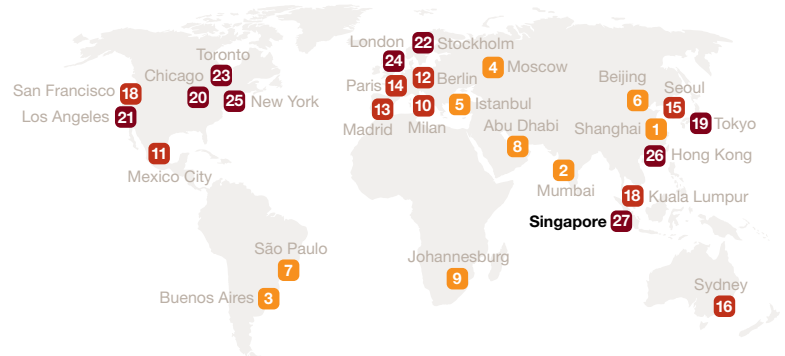
Transportation and infrastructure
page 56



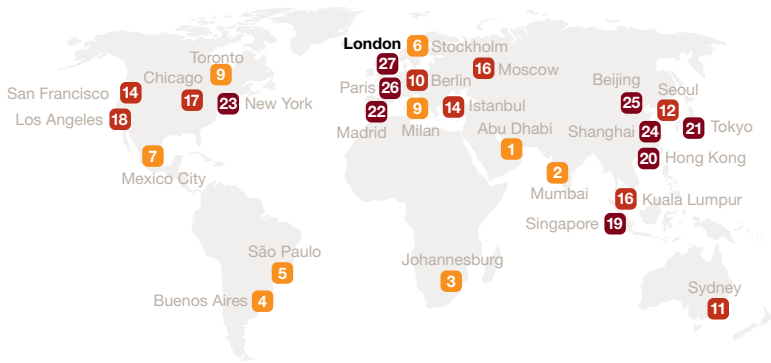
Economic clout
page 72



Ease of doing business
page 74



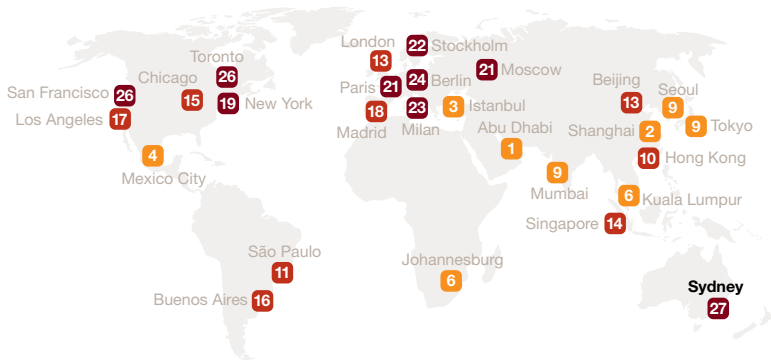
City gateway
page 44



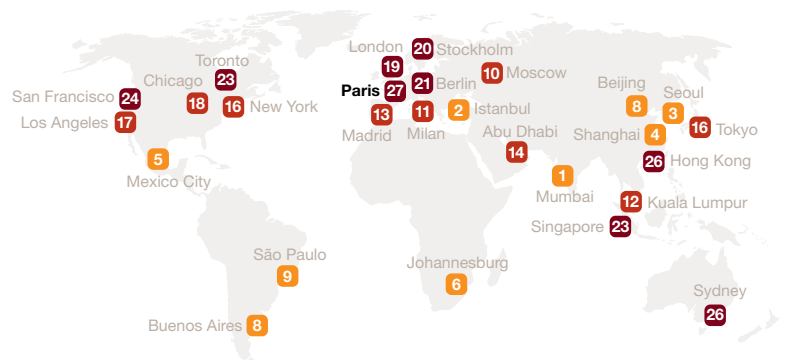
Technology readiness
page 50



Sustainability and the natural environment
page 62



Demographics and livability
page 67



Cost
page 76

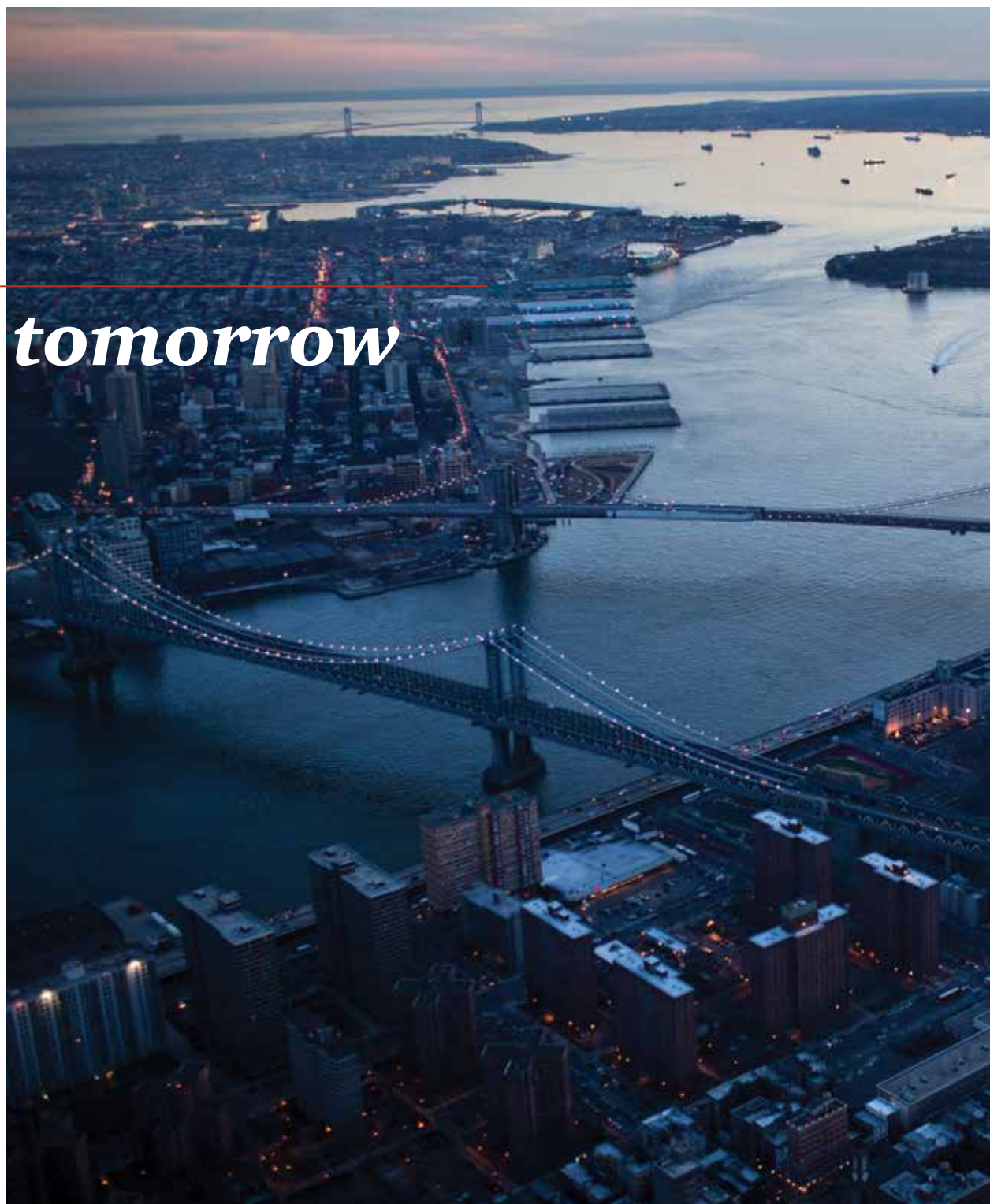


Map key

- High
- Medium
- Low

The 27 cities are sorted from the best to the worst performing, with each receiving a score ranging from 27 for best to 1 for worst. In ties, cities are assigned the same score.

The city tomorrow





New York harbor at dawn.

Our cities in 2025

From butcher to baker to memory-stick maker; From blue skies to thunderstorms ...

Our approach to projecting the future lies somewhere between Mark Twain, the American satirist, and Charles Goodhart, the emeritus professor of banking and finance at the London School of Economics. Twain famously said, “It’s difficult to make predictions, especially about the future.”¹ More recently, Goodhart said of central bank forecasting in today’s uncertain environment: “We need to refocus attention away from point forecasts to the range of possible outcomes, on potentially varying scenarios and on the need for flexibility (not pre-commitment) to respond to an unknowable future.”² We agree with them both.

Cities of Opportunity projects the future of economic growth, population, and employment in our 27 cities in a pragmatic spirit.

We establish a baseline projection to 2025 that assumes a continuation of urban growth but at a more modest pace than the boom before the Great Recession. In that environment, emerging cities skyrocket in population and employment, but mature cities retain much higher productivity. With average per capita wealth converging slowly over the forecast period, each will still need the other to buy and sell products and services—suggesting a continuing, mutual self-interest among our cities. (See chart on page 22, “The shape of city economies to come.”)

Our look at the future also suggests “what ifs” that push the probable envelope toward the possible. Scenarios investigate changes in the size of our urban pie through faster or slower macroeconomic growth as well as the same-sized urban pie being resliced with different winners and losers based on the relative importance of varying city qualities. (See next page for background on the methodology used.)

“What ifs” are constructed not as predictors but as parameters or signposts for government

and business decision-makers to consider in thinking and planning. They include scenarios in which:

- Knowledge, technology, and travel connections increasingly drive global investment decisions.
- Urban quality of life attracts businesses and people and, in turn, fuels progress.
- A restructuring alters the long-term employment picture through some combination of technological jobs displacement, government constraint, austerity, and a waning of consumer spending, with market forces adding to the downdraft.
- Protectionism spreads as a tactic to counter difficult times.

This seems the right time to take a look at the future of our cities for a number of reasons. The world has been moving on a fairly steady course in economics and finance for some years, often with expectations of continuity or even predictability. But social, political, scientific, and economic forces, all played out against the background of globalization and urbanization, suggest this presumed order may be changing. Standard explanations do not quite unravel the persistence of high unemployment, for instance, or capture the underlying technological transformation that shows signs of taking place (see page 34, “What if” technological unemployment finally dawns?”). These forces could play out in many ways that naturally concentrate their toll in cities.

On the positive end of the spectrum, constructive forces come together in cities also, as demonstrated in different ways by all the cities in our study. The upside potential is

¹ Baseball player Yogi Berra, physicist Neils Bohr, and movie mogul Sam Goldwyn are also widely credited with a version of the adage.

² Charles Goodhart, *Financial Times*, February 2, 2012, “Longer-term central bank forecasts are a step backwards.”

enormous and extends over a wide range of opportunities coming from both the mature and emerging worlds: students, travelers, and tourists increasingly drawn to cities; professional service sectors connecting and trading across an ever more intertwined environment; engineers, designers, and builders getting infrastructure up to speed with needs; and, of course, the potential that innovation represents in urban clusters. Some of humanity's greatest triumphs have been achieved by forward-looking cities that align governments, businesses, and citizens for the common good. This will be no less so in future.

“If we can make what we have a lot more livable, we really can develop something close to a paradise ... through rationality and an understanding of what we really are,” renowned biologist E.O. Wilson tells *Cities of Opportunity*. Wilson suggests that an

intelligent way to think about the evolving urban world and the natural one coexisting sustainably is to set aside half the planet for cities and the other half for the rest of life. At the same time, we can use the technologies we possess to build cities and communities in synch with human needs (see condensed interview on the next page, as well as www.pwc.com/cities for the full-length discussion and podcast).

In the end, issues of growth, place, people, resources, ambition, governance, collaboration and competition, vision and leadership feed into any city's vision of its own future. But no matter what that vision is, from cultural capital to manufacturing hub to biotech or information/communications technology cluster, it will be challenging to move the needle ahead at a time of straitened financing.

To do so, we once more turn to E.O. Wilson—who himself often quotes the Israeli diplomat Abba Eban—“when all else fails, men turn to reason.” This year, *Cities of Opportunity* turns to reason early in trying to frame evolving urban thought and action in the context of known challenges and probable and possible directions.

Learn more

See www.pwc.com/cities for videocasts and podcasts of interviews in addition to the full-length discussions. Detailed background on sources and definitions are also available.

How it works

The economic underpinnings of the “what if” scenario tool

Our “what if?” scenario tool is designed by PwC and the Partnership for New York City working in conjunction with Oxford Economics to create a forward-looking framework for urban thinking and to challenge preconceptions, not to predict what will occur. It was developed to measure what might happen if *Cities of Opportunity* indicators were more or less important in future business investment decisions or if macroeconomic patterns changed to influence the overall urban environment. This, like all scenario tools, depends on input assumptions and underlying relationships.

The baseline economic forecasts for each of the 27 cities build from a foundation of Oxford Economics's global cities, regional, and world models, all updated quarterly. Forecasts are customized to match the specific urban geographies used in *Cities of Opportunity*.

The “what if” scenario tool covers 22 broad sectors¹ for both gross domestic product and employment. The financial and business services sector is split into 10 job subsectors to capture the nuances of urban labor markets. Published sectoral GDP data are used with estimation techniques selectively filling gaps to complete the dataset. In the absence of employment data at a sectoral level, counts of business units are used to make effective subsector estimates. The employment data in the model refer to total employment, that is, self-employed plus employees.

GDP data are sometimes unavailable at a city level. Where estimation was needed, city sectoral employment data and metropolitan, regional, or national productivity estimates

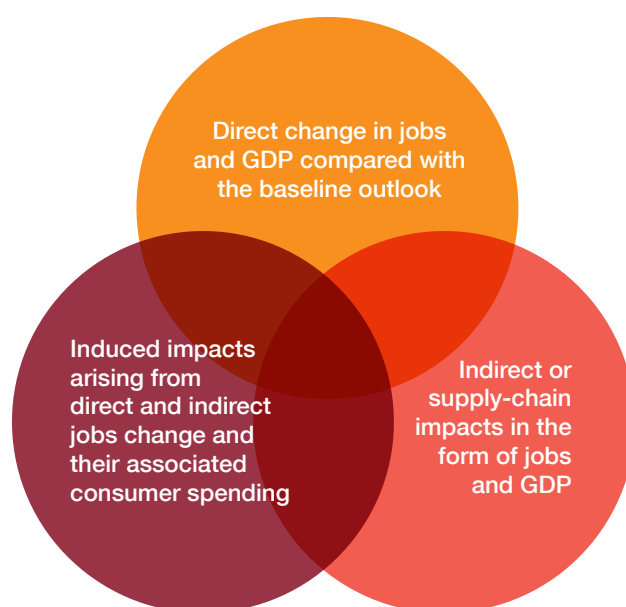
were adjusted for the particular urban geographies used throughout *Cities of Opportunity*.

To assess the impact that different *Cities of Opportunity* indicators might have on future economic outcomes, we analyzed each sector to determine “mobile” employment shares or those jobs or economic activity not serving the local market that could most readily be located anywhere in the world. That share of mobile employment is higher in sectors such as hedge funds, legal services, or manufacturing but lower in areas like healthcare, retailing, and transport. A locally dependent share was determined in all sectors according to three tranches of high, medium, or low employment mobility, with adjustments within each to create a dynamic scale. (For instance, we created a sectoral sensitivity matrix for the *Cities of Opportunity* indicators based on empirical evidence and qualitative input from Oxford's sectoral economists. This was used to adjust future sectoral growth across the cities when scenarios are run in the model.)

We considered performance on *Cities of Opportunity* indicators as signposts of cities' growth trajectories, and weighed in relative rank scores into the model. The model also links individual sectors to global trade performance

1 The sectoral definitions used in this study are consistent with the UK's 2003 Standard Industrial Classifications (SIC 03), the Statistical Classification of Economic Activities in the European Community (NACE), and the 2002 North American Industry Classification System (NAICS).

Three rounds of impacts determine a “what if” scenario’s results:



Continued from previous page:

(based on analysis of the historically observed relationships). This allows different global trade outcomes to be explored at a city level. In addition, the scenario tool adjusts productivity assumptions across sectors and locations and individually assesses different sectoral performance globally or

within cities. All this allows exploration of alternative economic trajectories and conditions for the 27 cities.

The “what if” scenario tool enables Cities of Opportunity indicators to be flexed individually or together with other indicators in terms of their future importance to investment decisions.

Three rounds of impacts combine to develop the results of an overall scenario. Direct jobs change is determined by the sectoral sensitivity matrix and *Cities of Opportunity* scores in each indicator category. Sectoral productivity provides an estimate of sectoral GDP change (with the model keeping the overall level of economic activity static or allowing it to rise or fall depending on the macroeconomic scenario). Supply-chain or indirect effects are calculated using city specific input-output tables (derived from national input-output tables and city employment structures). Induced effects are estimated using the direct and indirect impacts and consumer-spending data.

We factored in different urban productivity levels in determining overall and local city job tallies. That is, the total value of economic activity might remain the same, but job numbers are adjusted to rise or fall based on a city’s productivity. The model also moves jobs within the *Cities of Opportunity* universe and does not account for competition from cities outside our 27: Shenzhen, say, which is not in our study, taking jobs away from nearby Hong Kong, which is included. We also recognize that a city may appear to have the right stuff in our model to grow, but if underlying skills or infrastructure are lacking growth may be hampered.

Will the jobs relocate?

Ranking mobility among 22 job sectors from globally fluid to locally rooted

HIGH mobility	MEDIUM mobility
Manufacturing	Leisure, culture, and other
Mining	Transport and communications
Financial services	
<ul style="list-style-type: none"> Banking and finance Insurance and pension funding Activities auxiliary to financial intermediation 	
Business services	
<ul style="list-style-type: none"> Real estate and renting activities IT and computer related Research and development Architecture and engineering Legal, accounting, bookkeeping Advertising Professional, scientific, and technical services 	
	LOW mobility
	Agriculture, forestry, and fishing
	Construction
	Education
	Health
	Hotels and restaurants
	Utilities
	Wholesale and retail
	NO mobility
	Public administration

Source: Oxford Economics, Cities of Opportunity

The shape of city economies to come

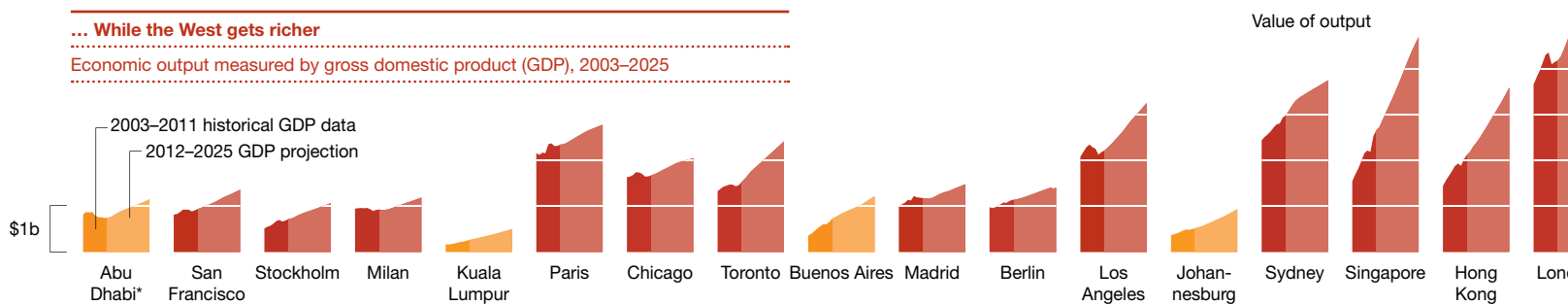
Growth should continue in the emerging world despite today's risks ...

Population vs. employment, 2012-2025



... While the West gets richer

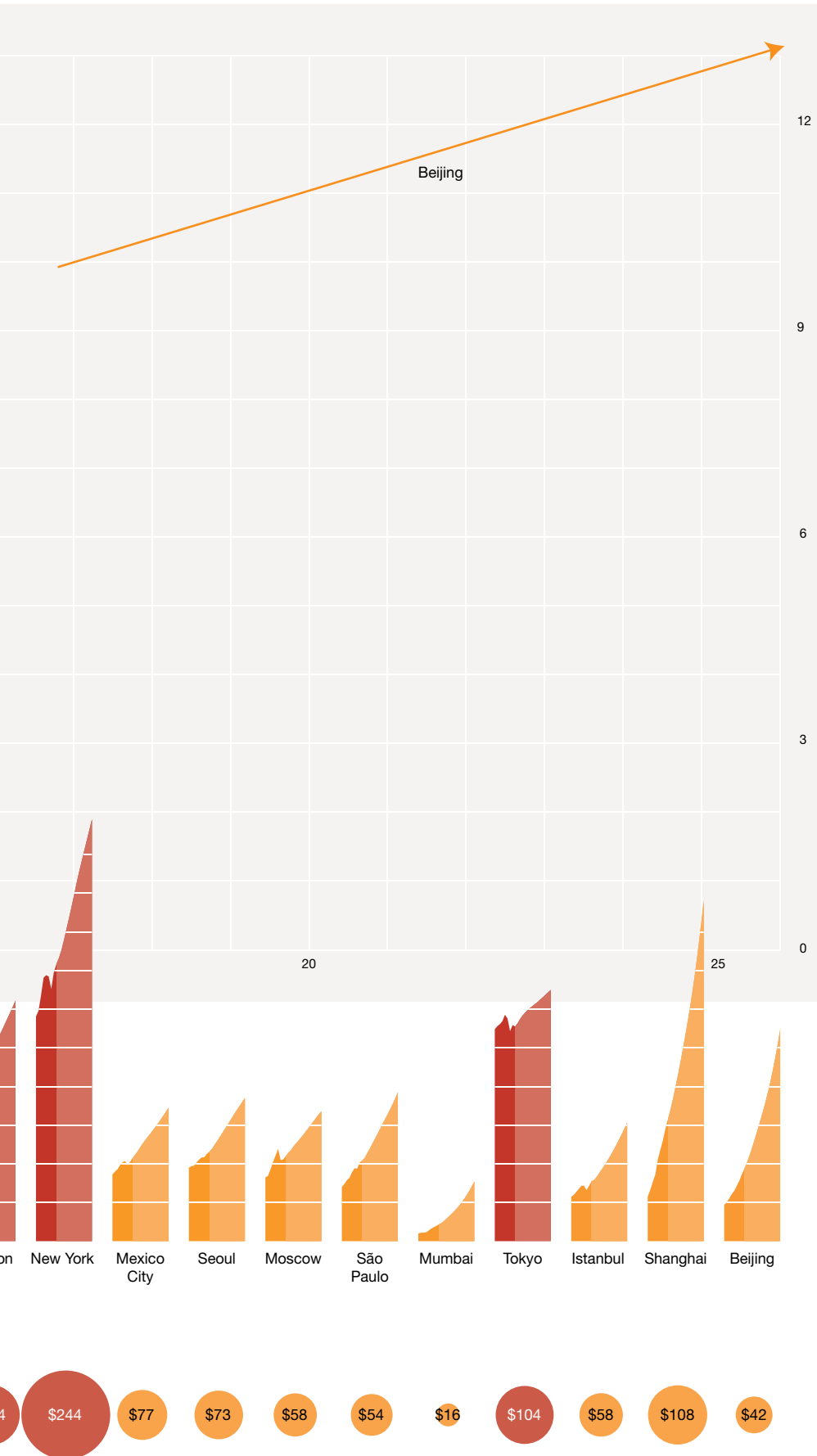
Economic output measured by gross domestic product (GDP), 2003–2025



Productivity (GDP per worker per year) in thousands \$US, 2025



*GDP driven by the oil economy
Source: Oxford Economics, Cities of Opportunity



Mutual self-interest unites developed and developing cities

A number of themes emerge charting the likely economic evolution of our 27 cities toward 2025. Foremost, the cities share as much interdependence as they do individuality—making as strong a case for cooperation to share in a richer pie as there is for competition to grab a bigger piece of a poorer one. Our 27 cities represent disproportionate economic muscle today, generating nearly 8 percent of world GDP with only 2.5 percent of the population. Looking ahead to the quarter-century, they will house 19 million more residents, account for 13.7 million more jobs, and churn \$3.3 trillion more in GDP if we continue on our current course of modest growth and avert serious economic crises.

But the big picture of divided East/West wealth and quality of life is unlikely to change unless transformations occur in the way we work and spend globally. Affluence is likely to remain in developed cities—whose long establishment, high productivity, and richer incomes tower over developing cities. The latter have a mountain to climb to catch up in productivity (and underlying areas like open governance, lack of corruption, and stronger physical and social infrastructure), even while growing spectacularly in population and employment.

If those improvements occur, employment patterns could change dramatically in developing cities, cutting labor dependency and jobs. But that issue may be upon us already as employment struggles to regain pre-recession levels and as a new phase may be dawning in the information revolution where less work is required and wealth must be shared in a more rational manner among the soon-to-be 9 billion of us. Meantime, our cities are intertwined. As long as the West possesses the time and money to buy goods and the rest of the world has the labor to create the products, symbiosis will continue, each side needing the other to prosper and making the case at least as strong for intelligent urban collaboration as it is for competition.



E.O. Wilson takes the very long view of cities

... and the human potential to “develop something close to a paradise ... through rationality and understanding of what we really are”

Edward O. Wilson, emeritus professor of entomology at Harvard, has spent 60 years at the university as a pioneering scientist, thinker, and author. Wilson has written 27 books, including the groundbreaking *Sociobiology* that in 1975 placed the social behavior of all animals, including humans, in the context of evolution. He has been awarded the Pulitzer Prize twice, for *On Human Nature* and *The Ants*, a monumental study of his first scholarly love. His most recent book, *The Social Conquest of Earth*, examines the fundamental questions of human life through the lens of man’s basic tension between individual and group selection. Here, Wilson extends thoughts from a lifetime of work as a scientist to cities and the planet as a whole.

Asked for seven words to describe yourself in a talk at the New York Public Library, you said, “The ants came, spoke, taught, and judged.” What would they say, what would they teach, and what would be their verdict if they walked through New York or Johannesburg or Shanghai?

I think that if you could get reason out of what they were doing and how they were organized, you would say for them that they came about through their higher level of social organization, which is one of the very few that ever evolved on earth, by altruistic cooperation. They would have to

reveal that we evolved in much the same way and through the same pathway of evolution. We followed the same rules and we have some of the same basic principles of organization. Then things begin to differ a great deal. But we really cannot understand our own origins without examining prehuman origins.

Do you think urbanization is programmed into our genetic leash and perhaps we’re a million years away from being as evolved in our cities as we might be?

I do not. Cities just happen to be the aggregate of convenience. They’re becoming more and more



"There are areas of Central Park that are pretty close to resembling a natural environment."

necessary for high productivity in technologically advanced societies, and also becoming a necessity as natural resources, or transportation back and forth between dwellings and city centers, become scarcer. All those things conspire to move us into cities. What we have to do is make cities a lot more livable, and, by that, I mean more consistent with the fundamental emotional needs, the instinctive needs of human beings.

What do you think are the ecological or sociobiological pluses and minuses of an urbanizing world?

It all depends on technology. We need to arrange cities so they're

livable, and that means adequate transport in and out and food channeled in and waste channeled out, and then within the city, development of living quarters with sufficient privacy. And a furtherance of a tendency—we're beginning to see nicely in New York City—of greening the dwellings themselves with balcony gardens, rooftop gardens, with creative landscaping everywhere. Then you can have a very livable city, and I believe then you have the great advantage, obviously, of what New York has. New York is the greatest city in the world. It's that way partly because of large numbers of people and a long history of wealth, with a class of the wealthiest people willing to or wishing to build up the institutions that have led to the best of the core of New York City today. So there are a lot of advantages to having a large city if you can organize it properly.

But another great advantage, one the Germans have already put into law, is they prevent suburban growth out from city and small town centers, and the result is that they have lots and lots of open countryside not far from where most of the people live. And that will become more and more the case.

What we have to do is make cities a lot more livable. By that I mean, more consistent with the fundamental emotional needs, the instinctive needs of human beings.

You have said, "We really don't know what on earth we're doing beyond our short-term goals. We're destroying the rest of life. It's important we keep a separate part, half of the earth, for the rest of life." Do you think cities should be reserved for us humans, and we set aside the rest of the planet for the rest of life?

I envision a human population, which the United Nations estimates if the current estimates are correct, stabilizing, we hope, somewhere around nine or 10 billion. That being the case, along with the increasing urbanization and, we hope, quality of life for almost everybody, that then we really could do what you just suggested—have a part for humans and a part for the rest of life.

And why is this valuable? It just makes good sense to leave the rest of life alone; that is, protect it enough so that it keeps on evolving the way it has, reaching its own sustainability, its own balances for 3 1/2 billion years. And then we can go on with all our own craziness. Urban, suburban, in the sky planting space vehicles to ruin some other planet, whatever things we do—we could go on without destroying so much of life that we eventually destroy ourselves or make the planet so

unpleasant that we really will want to go out to another location.

Do you say that altruistically or functionally, that it's better mutually for us and the rest of the planet?

Both. I think that we owe something to the rest of life. After all, it gave rise to us. We were born in a biosphere. We arose from animals, and we owe the rest of life something. And that's a completely human instinct or, I should say, moral attribute. It's very much in our self-interest to have a planet—to continue living on a planet—that's balanced, that has obtained sustainability through, literally, billions of years of evolution. ... *Leave it alone.* ... Give half of the world to the rest of life. Half should be more than enough when we've developed sufficient technology and sustainability techniques to give us a very good quality of life.

In Africa, you're working to save an endangered ecosystem at the same time Africa is the world's fastest urbanizing continent. What can be done to manage the interplay of advancing urbanism and nature?

It's pretty clear what needs to be done. First, various countries,

sovereign states, have to evolve away from dictatorships and high levels of corruption. They ought to be encouraged or helped to continue improving education and economic growth—although Africa is now also the fastest growing in percentage increase of GDP of any of the continents.

How would you relate the urgency of biodiversity loss to a New Yorker who rides the subway and rarely experiences nature?

We're talking about the need for technology and the humanities to be more democratized and spread more evenly, and conservation to be spread more evenly. We're talking about a city like New York that could, in due course, clean up a lot of the more obvious defects: the unlovely traffic, the condition of the poorest parts of it, and so

on. And I would remind anyone not to look down too much on New York City. There are areas of Central Park that are pretty close to resembling a natural environment. So, with parks in cities, combined with the improvement of the purely urban aspects of city life, I think you could get a pretty lovely city.

I know that Chicago is another good example of this. Chicago has what is called its Wilderness Program that 10 or 15 years ago started to map out all of the empty spaces—the road edges, the riverbanks, the vacant lots, the old and mostly neglected city local neighborhood parks. Chicago made complete maps of them. And then it set out to let them come back to the wild as much as possible, clean them up, make biological surveys of them, and start getting kids

and people in to enjoy them, all over Chicago. I think that's a neat program, and every city would benefit by having something like that.

You've said, "The human condition is being hung in between individual selection and its consequent sin and group selection and its resulting virtue." Can we have a nondestructive relationship with the natural world when we ourselves seem to be at war with ourselves, ranging from mundane daily greed and shortsightedness to actual wars?

That's a painfully accurate question. It certainly looks, from all of the evidence, that we are eternally and naturally conflicted. Any species that reaches the human level may—I don't want to get into science fiction but it may—be a

people, but to realize that group distinctions, and group competition and individual competition within groups, is just the way we are. That's what made our species. And we really should try to find the solutions to our problems that do not entail pushing and coursing toward what one group or other sees as the perfect harmony—a harmonious solution—but, rather, just to abate and damp the differences between us in a manner that's based upon human self-understanding. And that's not so hard to achieve. It just takes a rethinking of the foundations of human science—the science about humans. But we don't really want to go to one extreme or the other, do we? We stay somewhere in the center because it's that ferment of the center, between the two opposing impulses, our conflicted nature, which makes us creative.

It's in the conflict that we try to move ahead?

I agree. If we can make what we have a lot more livable, we really can develop something close to a paradise. By developing through rationality and an understanding of what we really are, we can get a very livable planet to stay on.

Can there be enlightened city policies to address the great fear that people have in a time of global migration toward new immigrants?

Yes. Look at it the way a geneticist would. We're evolving in a way to homogenize the human genome. Up until quite recently, a very large part of the genetic differences or variation in humans were the differences from place to place: shall we say, from Stockholm to Beijing. There are a lot of genetic differences between those people—and they're extraordinarily similar, incidentally—but they are what differences occur in the human species. That's the difference between localities. But one result of globalization is that we're homogenizing. And now the differences between localities

conflicted species in that manner. And that conflicted condition means that we are always torn between the two impulses of individual survival and development at the expense sometimes of others and the nobler, the better angels of our nature—the products of group selection—on the other hand: the group selection that made us what we are.

So the solution to our problems is not to define the best religion and try to get everybody into it; it's not to define the best ideology certainly, as though there were a perfect ideology that we are evolving; it's not to expect complete harmony among cooperating

We should give half of the world to the rest of life [and half to cities]. Half should be more than enough for us when we've developed sufficient technology and sustainability techniques to give us a very good quality of life.

are diminishing, and the amount of variation within each locality is increasing. And I'm optimistic to think that the result will be a greater flourishing of genius, of special talents, and it'll be a much more interesting species the farther along that line we go.

Do you think evolution at all pushes us toward the virtuous, toward logic?

I don't think a genetic evolution does. What'll happen is that it will be a cultural evolution in which we have the same ferment, we have the same conflicted nature. I think that probably now, instead of little wars, and battles against dictators and clashes of different religions, we will work out our energies in the area where we've always dearly loved and exercised our hottest instincts and great passions—*team sports*. People in a more civilized society will still be having all those emotions but it'll be in a tamer arena. I don't perceive the possibility of smoothing out and pacifying the human species. I think we'll always be conflicted and we'll always have our crazy games and conflicts, but we can ritualize them and moderate them more, just as we move toward a more stable population and a more stable, sustainable planet.

You've said, "We have Stone Age emotions, Medieval institutions, and Godlike technology. We'll either settle down as a species or completely wreck the planet. We need to evolve to a better world order than the current *Star Wars* civilization. ... We need to reignite the 18th-century Enlightenment. We now know enough scientifically to do so." In the context of cities, please tell me what challenges or issues you'd most want to attack in an Enlightenment spirit?

I think that we're quickly coming to an agreement as a nation and as a world, too—and maybe with enough urgency to actually do something about it. We really

have to improve education systems. We need far better methods of teaching. We need better incentives for teachers, and especially to include education in science and technology because we are now entering a techno-scientific world. The techno-scientific revolution is here and it's pervading every minute of our lives. People are not going to be able to understand the most fundamental questions about our species—things we used to call philosophical questions, urgent questions of reality—we're not going to be able to handle these things, particularly dealing with group conflicts. That's the part I like to think of as something everybody could agree on.

I myself right now have a foundation that is setting up in partnership with Apple an online course in biology, which I hope, and I know this was the goal of Steve Jobs, will give the opportunity for an education, an

interactive education that can be adapted to classroom techniques, the same education to a kid in Paraguay, Angola, Mozambique, or outer Mongolia that you can get in a prep school in Connecticut. We could do that kind of thing with technology. I like to think that we can make big leaps in education, and it's absolutely necessary for the future of this country and the world at large.

Our hypothesis in *Cities of Opportunity* is that strong quality of life forms a virtuous circle with a strong economy. If you have jobs, you'll have more schools; if you have parks, you'll have more happy people who want to go to the schools and be productive. It forms a sort of virtuous circle. Does that make sense?

It makes complete sense. You're talking about positive reinforcement in the network of activities in cause and effect. Another thing that makes things hopeful is what

the chemists called autocatalytic reactions. That is to say, when you get a product created by putting certain ingredients together—this is in chemistry—the product itself becomes a catalyst. So the reaction speeds things up, and you get more and more products like that, and it just takes off exponentially.

Final question. How did you feel when you learned that Björk, the Icelandic singer, named the world's first app album "Biophilia" after your book?

I could not be more pleased to be connected with a rap operation.

That's funny.

This conversation has been so pleasant for me, I hate stopping.

Learn more

A podcast of this condensed conversation is available at www.pwc.com/cities, as is a full-length print version of the entire discussion.

E.O. Wilson in Gorongosa National Park, Mozambique.



The 2025 baseline scenario

Our cities weave a surprising tapestry of jobs

Our 27 cities currently produce 8 percent of the world's wealth despite housing only 2.5 percent of its population. In looking toward the future, *Cities of Opportunity* assumed a continuation of growth to quarter-century but at a more modest pace than during the boom years before the Great Recession. This outlook represents good growth in the face of current challenges but no return to the high levels of a few years ago for a number of reasons, notably including the large overhang of debt in the developed world.

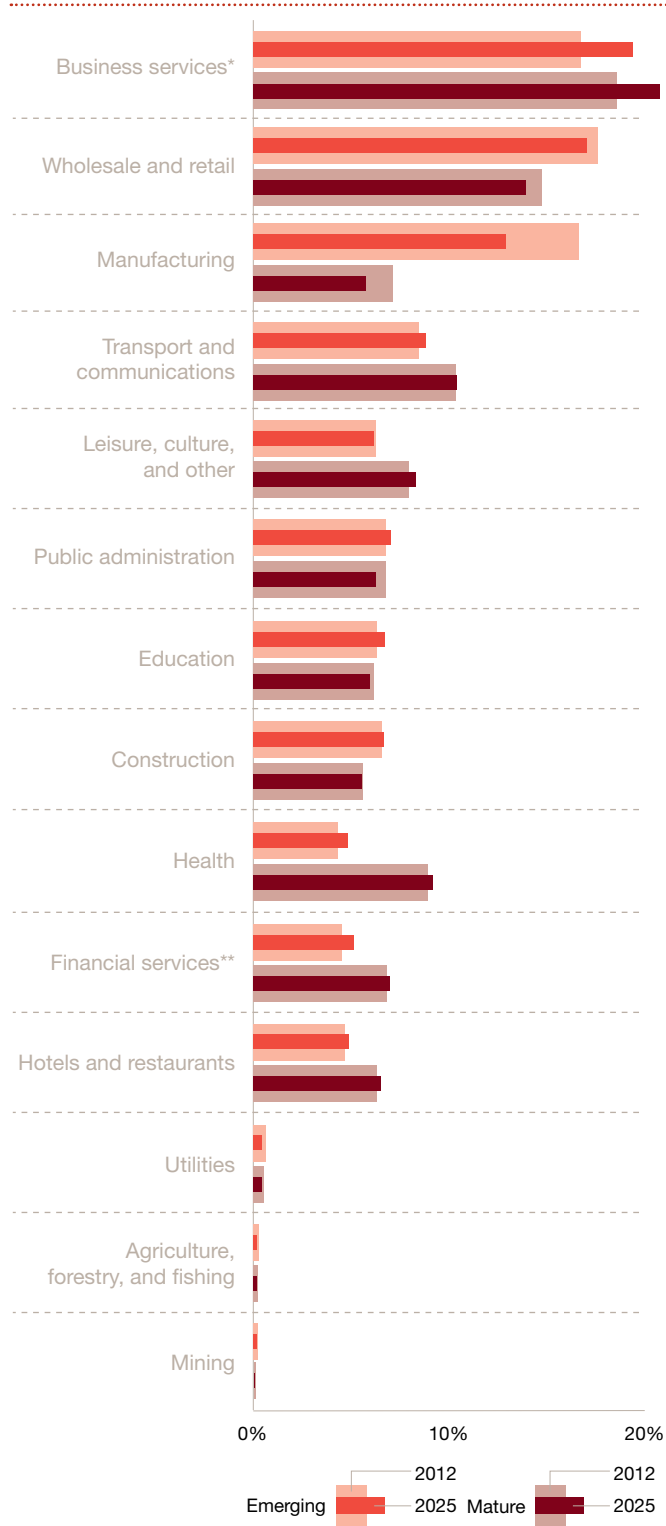
Building from this outlook, we developed our 2025 baseline scenario as the foundation for all “what if” projections. The baseline shows that by 2025, 19 million more people will be living and 13.6 million more working in our cities. The 27 cities will generate an additional \$3.3 trillion in gross domestic product.

Even with growth projected to be strong in emerging cities, Western customers are not foreseen borrowing and spending as in the past, depriving the emerging world of key customers who could supply the wealth to build their own cities—currently gaining 40,000 people a day in China and 20,000 in India, to cite only two in the staggering array of statistics on urban growth in Asia, Africa, and Latin America. (See pages 78-91, *Cities at the edge*). But consumers from mature cities with higher relative wealth and per capita productivity will still be needed by emerging cities to buy their goods and services. In short, both families of cities, mature and emerging, remain in it together.

Broad brushes of this general picture are known. However, when we look closely at individual cities and consider the different gears in the engine needed to continue social and economic prosperity, shadings of meaning come into play that are relevant to government, business, and community decision-makers.

What exactly do all those people in Shanghai or New York or Milan or any of our cities actually do to support themselves, to drive the economy from day to day, and to continue both the upkeep and innovation that assures future well-being?

The evolving percentage of employment by sector—emerging and mature cities
2012 and 2025



***Business services include:**
Real estate and renting activities
IT and computer-related
Research and development
Architectural and engineering
Legal, accounting, bookkeeping
Advertising
Professional, scientific, and technical services

****Financial services include:**
Banking and finance
Insurance and pension funding
Activities auxiliary to financial intermediation

Source: Oxford Economics, Cities of Opportunity

Each city in its own right is a highly complex ecosystem. The jobs at the heart of a functioning city typically turn out to be in retail, healthcare, public administration (or government), and business services—a diverse and fundamental cross-section needed to make a city run. At the same time, the bills are paid by exportable manufactured goods in emerging cities and globally tradable professional and financial services in mature ones.

Our top two employment sectors, business services and wholesale and retail, account for a third of all jobs in 2012. This rises to 36.3 percent in 2025. Business services—including real estate, IT, and computer-related work, architecture and engineering, advertising, legal and accounting, and other professional

or technical services—tend to be more dominant in developed cities with sophisticated needs. Wholesale and retail account for more jobs in emerging cities with a higher concentration of small stores and lower overall productivity.

Manufacturing plays strongly in the mix as well, employing the third most people, again disproportionately stacked toward emerging cities. However, as emerging cities grow in affluence and sophistication, they are diversifying away from manufacturing (see charts below). Mature cities, meantime, engaged in trying to build balanced economies and taking advantage of idled factories and derelict waterfronts, are often encouraging entrepreneurial manufacturing.

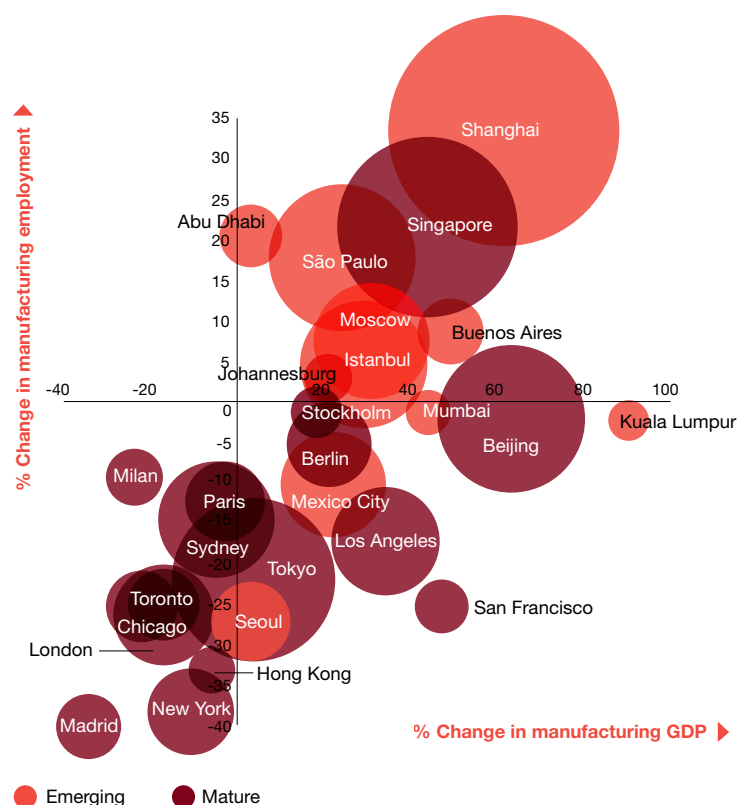
Those working in the very guts of the city come in fourth and sixth overall in terms of generating jobs. This includes the transport and communications workers, at 9.2 percent of jobs, who are behind the scenes as the rest of the city moves about, and the public administrators in city halls and city parks, whose 6.8 percent of overall jobs are often now threatened by austerity budgets. Workers in the leisure and culture segment account for 6.9 percent of jobs, fifth overall in 2012, with all our cities being major business travel and tourist destinations as well as entertainment hubs.

All in all, well-functioning city economies depend on job sectors fitting together hand in glove. Supporting services that keep cities churning from day to day, from the glamorous
Continued on page 39

The role of manufacturing continues to evolve

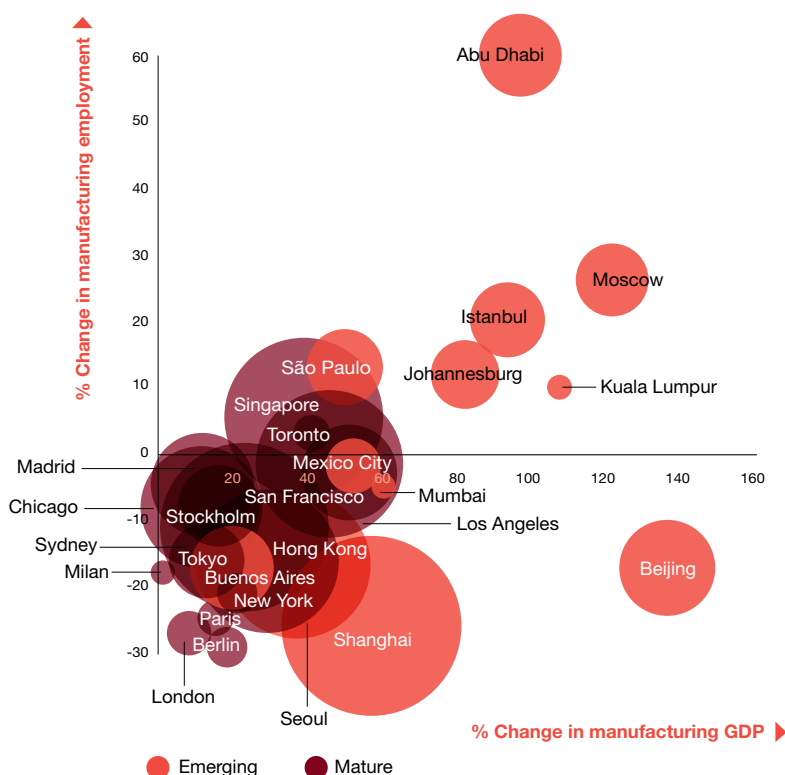
Manufacturing employment has been shifting from West to East

Change in manufacturing employment vs. Change in manufacturing GDP (2004-2012)



Some emerging cities are beginning to diversify from reliance on manufacturing

Change in manufacturing employment vs. Change in manufacturing GDP (2012-2025)



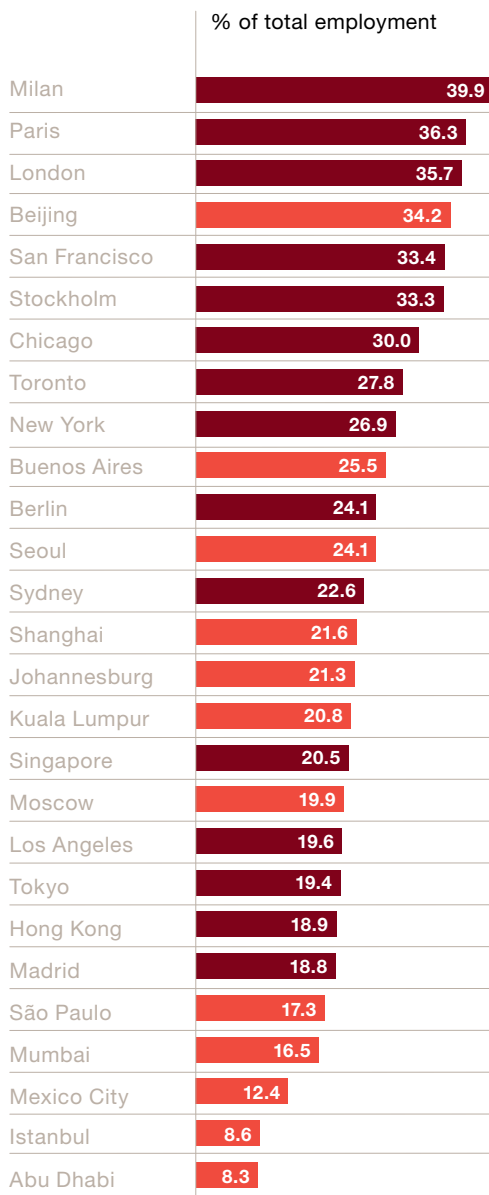
Where the jobs are

City employment today in six sectors

An in-depth look at some of the most significant or telling job sectors among the 22 we measure creates a city-by-city employment mosaic. Financial and business services, manufacturing, and retail anchor many economies. Construction gives a hint of urban optimism, while health as well as hospitality and tourism add meaningful color to the shape of the local economy.

Financial and business services*

2012



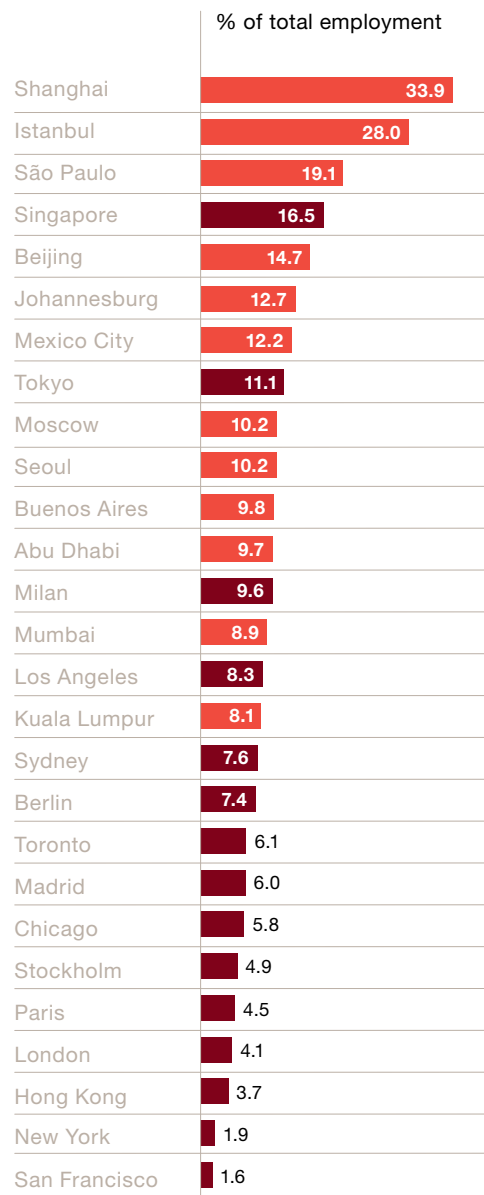
Emerging Mature

*Combines financial services and business services sectors, which include the 10 subsectors listed on page 28.

Source: Oxford Economics, Cities of Opportunity

Manufacturing

2012

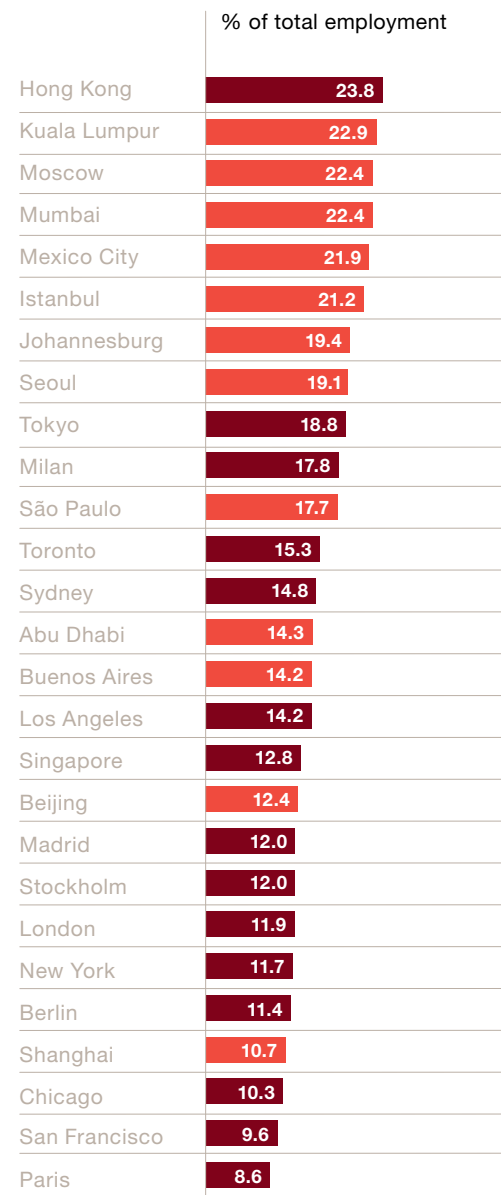


Emerging Mature

Source: Oxford Economics, Cities of Opportunity

Wholesale and retail

2012

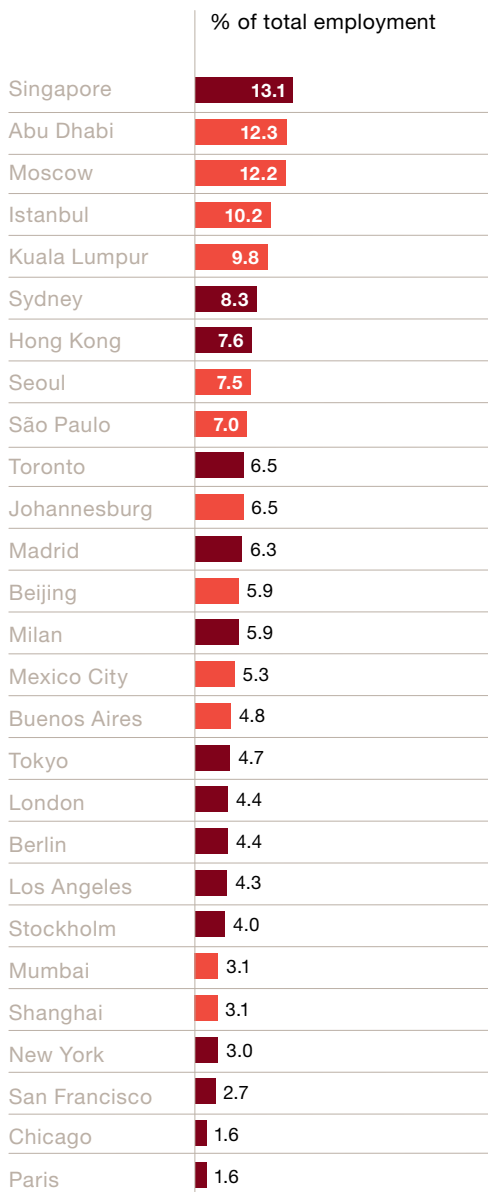


Emerging Mature

Source: Oxford Economics, Cities of Opportunity

Construction

2012

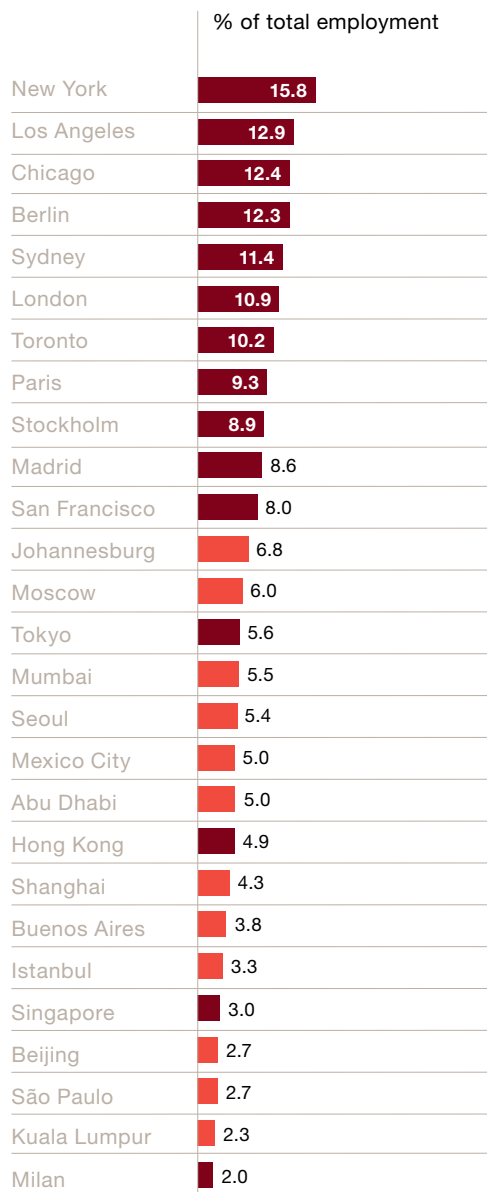


Emerging Mature

Source: Oxford Economics, Cities of Opportunity

Health

2012

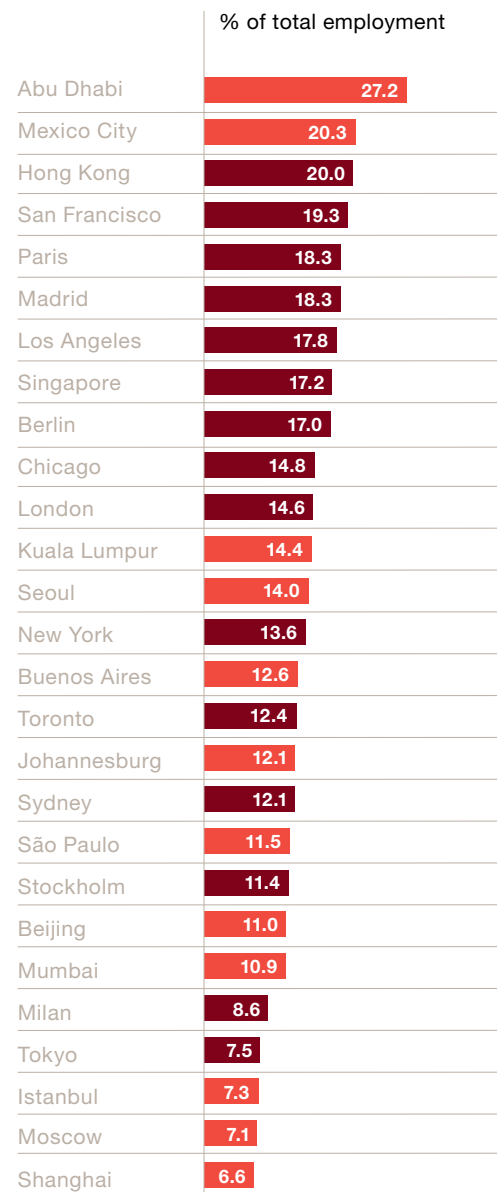


Emerging Mature

Source: Oxford Economics, Cities of Opportunity

Hospitality and tourism*

2012



Emerging Mature

*Combines two sectors: leisure, culture, and other; and hotels and restaurants.

Source: Oxford Economics, Cities of Opportunity

“What if”

... Cities prosper based on knowledge, technological, and travel connections?

In the context of rapid globalization and increasingly pervasive interconnection, it's easy to picture a world where the cities that prosper are those with the deepest, broadest, and highest-quality education, those that are “wired” most thoroughly and effectively, and those with easiest access to, from, and for the rest of the world.

If businesses, along with workers of all levels most likely to follow demand, make their location decisions seeking those cities with the right stuff for an urbanizing, globalizing, and expanding world, cities that perform well in all three will gain a larger share of internationally mobile jobs. This is represented by three of our indicator categories, intellectual capital and innovation, technology readiness, and city gateway.

The cities that lead in those qualities now are mature global and regional centers, and they would build on their strength going forward. Projected to 2025, London, Tokyo, New York, Seoul, Paris, Singapore, Chicago, Stockholm, and San Francisco lead the way in terms of capturing more jobs. London takes a

commanding lead in terms of 829,000 additional jobs gained versus the 2025 baseline projection. Mature city economies also grow faster in this picture, with London, Paris, and New York gaining nearly a point or more each in GDP growth by quarter-century. Among the cities most hurt, São Paulo, Mumbai, Beijing, Shanghai, Buenos Aires, and Mexico City would experience the greatest “brain drain” versus the 2025 baseline projection.

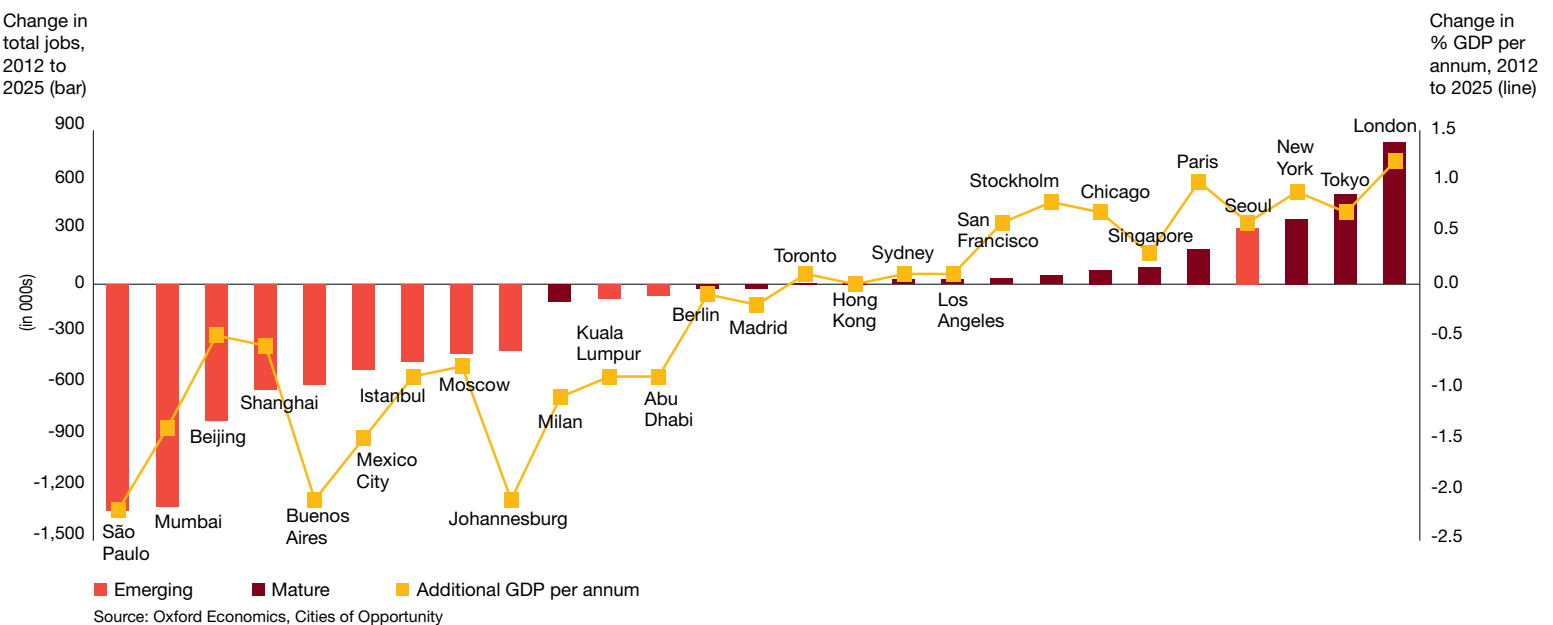
On the other hand, higher relative productivity in this scenario also depresses the overall number of jobs among our 27 cities by 4 million less than the 2025 baseline projection because the increasingly efficient urban economies anticipated in this world would employ fewer people in the supply chain (even more so in mature cities where more workers reside outside the city jurisdiction).

Continuing in this line of reasoning, we also tested a likely outgrowth of the scenario: What might occur if additional economic buoyancy tracks with an urban world in which knowledge and greater connectivity drive progress? We projected international trade

growing an additional 3 percent per year, translating into a total city GDP increase of an additional 1 percentage point annually and 8.2 million more jobs than the 2025 baseline projection. In this case, London and Tokyo still lead, but emerging cities that tend to be more sensitive to international trade gain a major boost. Beijing and Shanghai, for instance, jump from the bottom to near the top of the rankings with accelerated trade. Moscow and Istanbul move up the rankings also, but less dramatically.

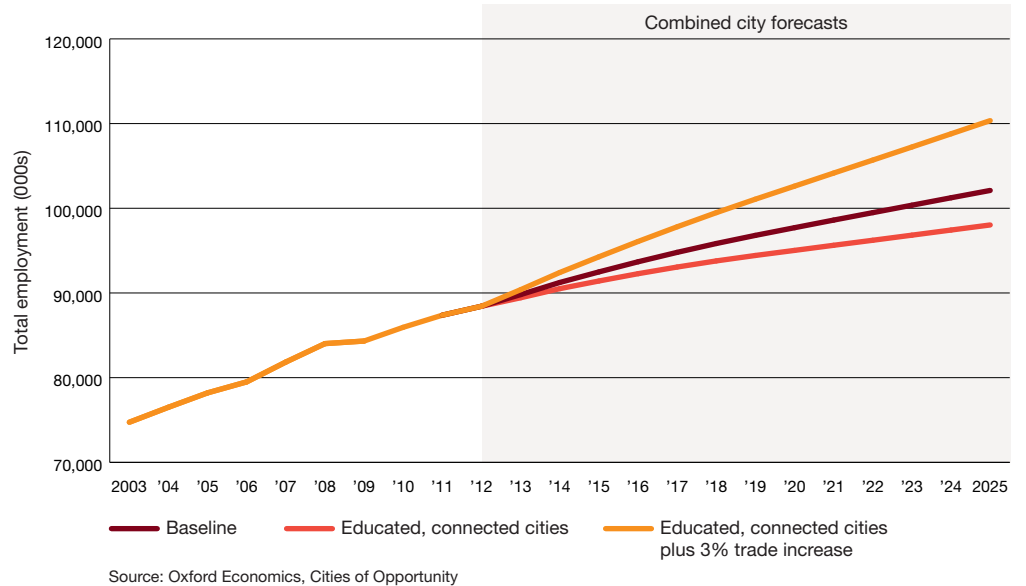
London leaps ahead in a world where educated, connected cities count, but growth falls in emerging cities

Change in jobs and GDP



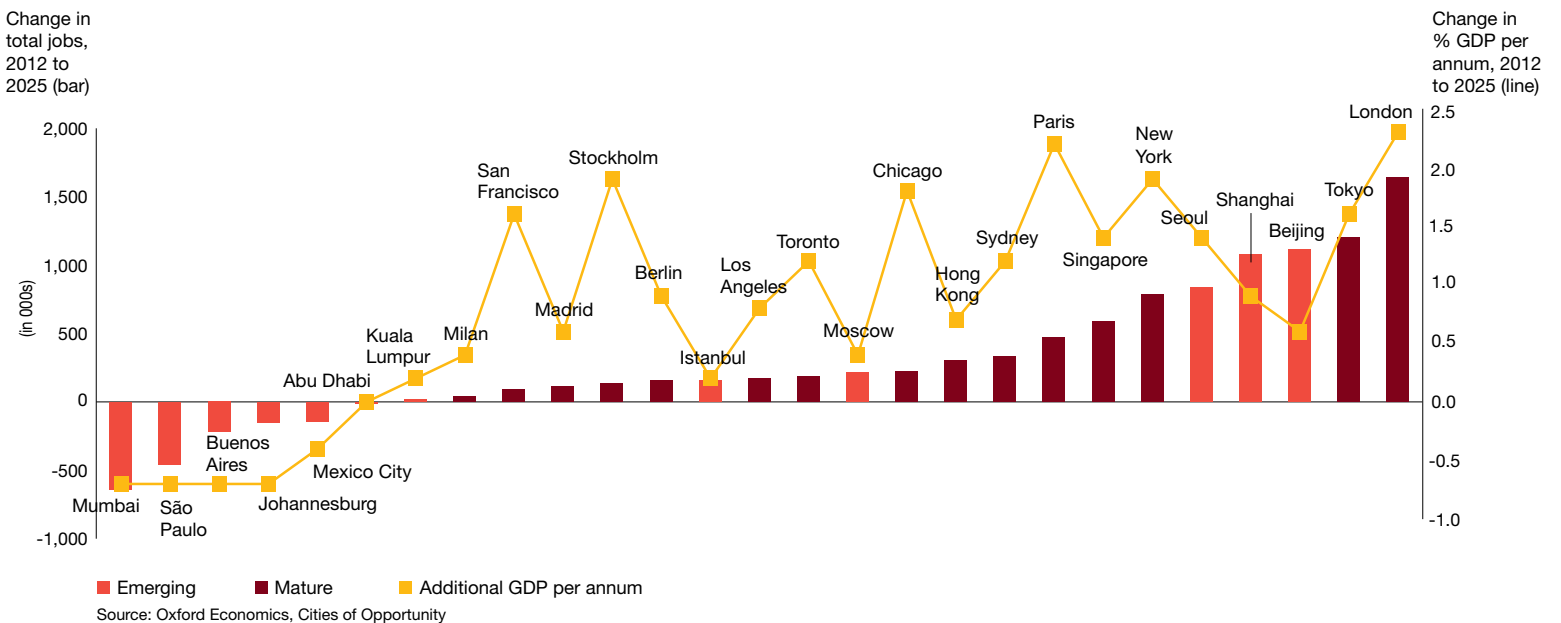
London takes a commanding lead in terms of 829,000 additional jobs gained versus the 2025 baseline. Mature city economies also grow faster in this picture, with London, Paris, and New York gaining nearly a point or more each in GDP growth in the time frame.

Comparing patterns: productivity pares jobs, trade multiplies them



The employment picture improves if trade rises in an educated, connected world

Change in jobs and GDP



“What if”

... Technological unemployment finally dawns in a slow-growth, urbanized world of 9 billion?

History has its ups and downs, from extinctions to Great Depressions and wars, to Ages of Enlightenment and Discovery. In economics, Joseph Schumpeter referred to cycles in capitalism as “creative destruction.” But end of day, history is written by the winners, as George Orwell, Winston Churchill, and Napoleon said in one form or another—better to end up a flexible survivor than a magnificent dinosaur. The same aphorism goes for cities caught amid transformation. Today, enough handwriting is on the wall to question whether a presumed return to an economic equilibrium of steady, strong growth is around the corner.

In this “what if” scenario, a combination of technological, economic, and sociopolitical forces create something bordering on a perfect storm in terms of job loss. Technology plays a greater role in low value-added service sectors as companies replace labor with relatively less expensive technology (striking most visibly in retail through self-service cashiers, online shopping, and the threat that city stores may morph into showrooms); constrained governments pare jobs in public administration, health, and education to reduce spending and borrowing (depressing construction as well as public infrastructure investments); consumers cut their spending in the face of high personal debt, more restricted access to credit than before the recession, and sustained high levels of unemployment, with the downdraft cutting demand in retail, hotels and restaurants, leisure, culture, and other services.

Employment and GDP growth fall across the spectrum. On the jobs front, Beijing, Shanghai, and São Paulo lose the most jobs because of the size and structure of their economies, with London and Tokyo following. Wholesale and retail, the second largest employment sector among our 14 categories at 16.5 percent, might prove especially vulnerable. Despite the buffeting, however, Mumbai, Beijing, and Shanghai are still estimated to grow significantly in GDP through 2025 supported by general growth in population (although a risk remains that less favorable labor markets in these cities could slow down population expansion with implications for overall GDP growth). Paris, Tokyo, Sydney, and Chicago would contract in GDP terms.

A few trends suggest transformative restructuring could reasonably be on the horizon. As Lawrence Summers, former US Treasury Secretary, notes, “the agricultural economy gave way to the industrial one because progress enabled demands for food to be met by a small fraction of the population, freeing large numbers of people to work elsewhere. The same process is now under way with respect to manufacturing and a range of services, reducing employment prospects for most citizens.”¹ Nobel economist Joseph Stiglitz adds separately, “the Great Recession is part of the transition from manufacturing to a service sector economy. ... Markets on their own do not manage such dramatic economic transformations well.”²

Science appears to be playing a role in the change also. While Keynes discussed “technological unemployment” 80 years ago, humans have so far held their own against machines as technology has created as many jobs as it has destroyed. There are signs, however, that this could be changing and that robotized, computerized competitors are closing in a little too fast for human comfort.

“The pace [of technological innovation] has sped up so much that it’s left a lot of people behind. Many workers ... are losing the race against the machine,” contend MIT professors Erik Brynjolfsson and Andrew McAfee in *Race Against the Machine*.³ “And it’s not just workers. Technological progress—in particular, improvements in computer hardware, software, and networks—has been so rapid and surprising that many present day organizations, institutions, policies and mindsets are not keeping up.”

Brynjolfsson and McAfee are optimistic that humans will not invent themselves out of a day job because some of our “skills are more valuable than ever, even in an age of incredibly powerful and capable digital technologies.”

¹ Lawrence Summers, *Financial Times*, January 9, 2012, “Current woes call for smart reinvention not destruction.”

² Joseph Stiglitz, *Financial Times*, March 13, 2012, “The American labour market remains a shambles.”

³ Erik Brynjolfsson and Andrew McAfee, *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, 2011, Digital Frontier Press.

Employment and GDP growth fall across the spectrum. On the jobs front, Beijing, Shanghai, and São Paulo lose the most jobs, with London and Tokyo following. Wholesale and retail, the second largest employment sector, suffers greatly in those cities where it dominates.

However, of importance to short- and medium-term planning in city governments and businesses, not to mention citizens, “other skills have become worthless, and people who hold the wrong ones find they have little to offer employers. They’re losing the race against the machine, a fact reflected in today’s employment statistics.”

The potential toll of technological unemployment jumps out in the second largest job sector among our 27 cities—wholesale and retail, where the possibilities of job displacement could be immense through changes such as in-store mechanization and online shopping. Wholesale and retail now employ one in six persons in our cities overall, and in a city such as Hong Kong that share rises to nearly one in four, or roughly one in five in Mexico City, Kuala Lumpur, Istanbul, Mumbai, Tokyo, and others.

Financial uncertainty adds to the picture. “The economy has clouds hovering over it,” says John C. Bogle, founder of Vanguard Funds. “And the financial system has been damaged. The risk of a black swan event—of something unlikely but apocalyptic—is small but real.”⁴

Sociopolitical forces come powerfully into the equation against the backdrop of rising levels of unemployment (often disproportionately high among the young), increasing income inequality in some places,⁵ austerity in others, and growing popular resistance bubbling up to a consumer-goods-driven economy.⁶ Add to that the tension that urban immigration, whether domestic or international, often stirs, and the mix offers a wake-up call to leaders and policymakers in government and business.

“When distrust in a system becomes widespread among small players, it throws up something like Occupy Wall Street, or like the Tea Party. Or like, for instance, the French revolution,”⁷ writes Margaret Atwood, Canadian author of, among many other works, *Payback: Debt and the Shadow Side of Wealth*. The think tank Demos notes populist parties that “do not fit easily into the traditional political divides” have been growing for the past decade across Western Europe. Demos adds that “the growth of these movements is mirrored online. ... This nascent, messy and more ephemeral form of politics is becoming the norm for a younger, digital generation.”⁸

Even with less than a perfect storm, creative destruction sounds better on paper than it looks in real life. Cities may be in for a bumpy ride if some of these economic, scientific, and sociopolitical forces that naturally concentrate in cities move in the wrong direction simultaneously. Understanding the possible future course can help stakeholders in government, business, academia, and the community think through policies and actions today.

4 Jeff Sommer, *The New York Times*, August 12, 2012, “A mutual fund master, too worried to rest.”

5 “Growing income inequality in OECD countries: What drives it and how can policy tackle it?” OECD, May 2, 2011, www.oecd.org/els/social/inequality.

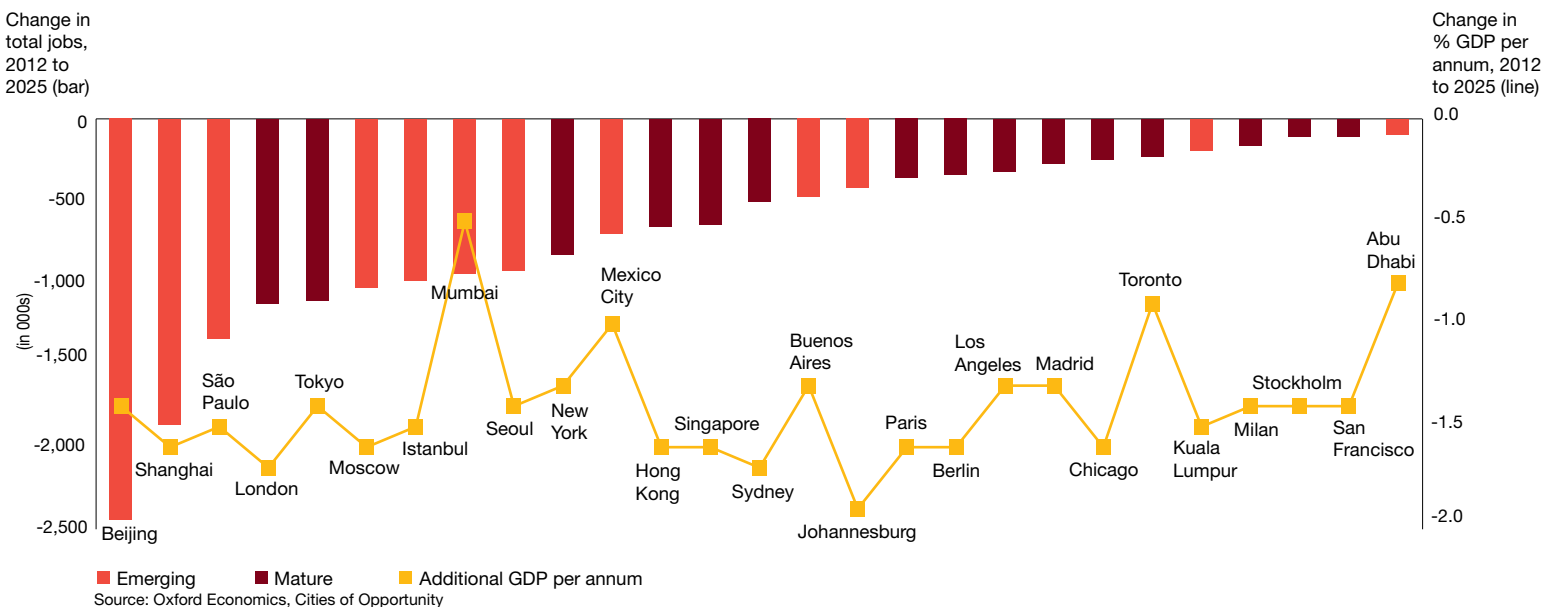
6 In addition to movements such as Occupy Wall Street, other examples include the Five Star Movement in Italy, whose “environmentally friendly, anti-consumerist, pro-education platform” is “committed to changing Italy’s entrenched political system by offering an Internet-based alternative.” From *The New York Times*, May 24, 2012, Elisabetta Povoledo, “Caustic comedian in Italy fosters a movement against traditional politics.” Or, according to Enrico Rossi, president of Tuscany, “consumerism is not the right response to the crisis. It is an insult to our cultural identity, our traditions and our history.” From *The New York Times*, January 7, 2012, Elisabetta Povoledo, “In Italy, mom-and-pop stores worry that longer hours may hurt business.”

7 Margaret Atwood, *Financial Times*, April 14, 2012, “Our faith is fraying in the faceless god of money.”

8 “The new face of digital populism,” Jamie Bartlett, Jonathan Birdwell, Mark Littler, 2011, Demos, www.demos.co.uk.

An employment restructuring cuts deeply as the industrial/information revolution takes a new turn

Change in jobs and GDP



“What if”

... Protectionism spreads as a way to counter lingering slow growth?

Protectionism sits on the other side of the coin from the faster trade that might occur in a world powered by urban know-how and connections. And it is reasonable to consider that nations struggling to energize their economies will turn to trade restrictions in a world of slow or no growth and rising political pressure to improve conditions. In fact, reports from the World Trade Organization,¹ European Commission,² and Global Trade Alert³ all point to a notable uptick in protectionist measures through the end of May 2012.

We took a step back and tested what might occur if, in our 2025 baseline, protectionism widens globally, the recessionary slide continues, and, ultimately, trade shrinks 2 percent per year, translating into a 1 percent drop in GDP across our cities.

Here, trade-dependent emerging cities tend to suffer the greatest job losses, though not in a lockstep pattern. For instance, Beijing, Shanghai, and São Paulo lose the most jobs, but London and Tokyo follow closely in losses because of those cities’ structure of employ-

ment and therefore exposure to drops in trade. In terms of dampening GDP growth, Shanghai leads the losers, followed closely by mature cities like Milan, Paris, Chicago, London, and Stockholm, with large shares of employment in internationally tradable activities. Mumbai emerges partially insulated because of low tradable-sector employment and high domestic growth.

In the end, this scenario takes away 10.4 million jobs and destroys \$1.1 trillion in potential GDP by 2025 relative to the 2025 baseline projection—far worse a toll than the educated and connected “what if” in which productivity pares jobs.

A highly productive urban world might destroy 4 million jobs in our 27 cities. But trade shrinkage kills 10.4 million jobs and \$1.1 trillion in gross value added by 2025.

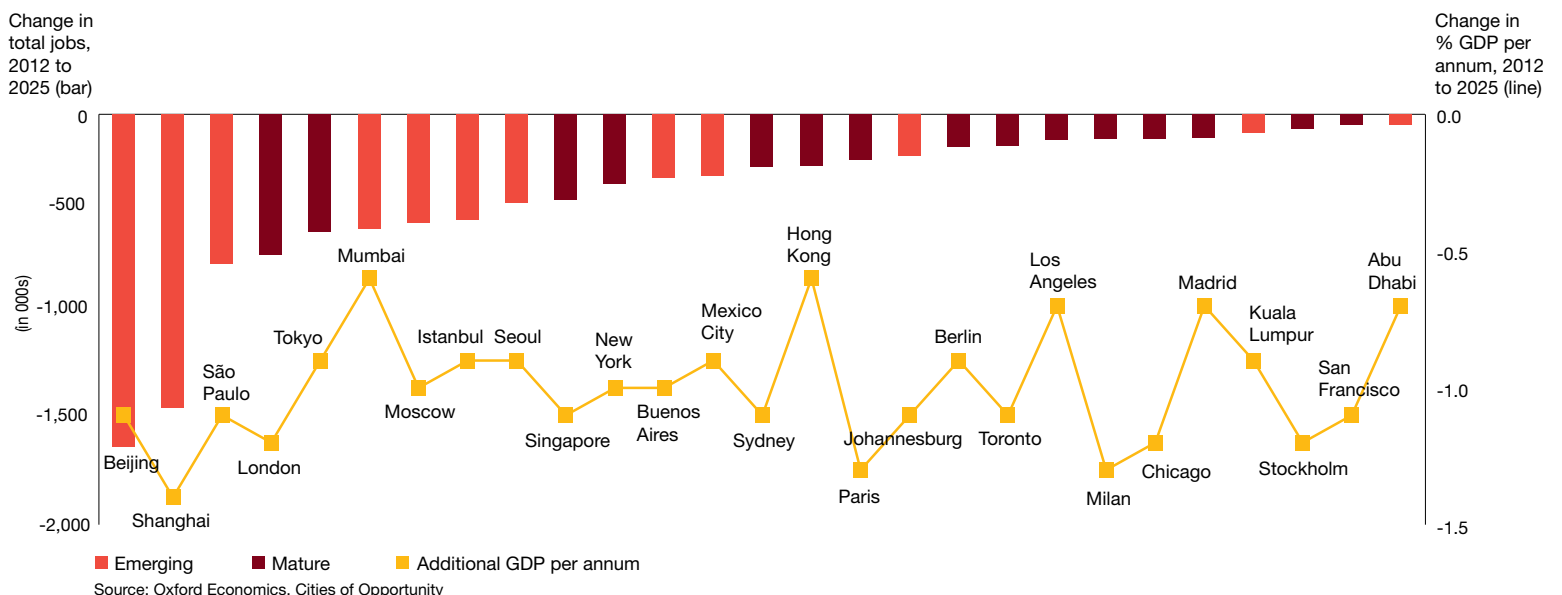
¹ “The more recent wave of trade restrictions seems no longer to be aimed at the temporary effects of the global crisis, but rather at trying to stimulate recovery through national industrial planning,” according to *Report on G20 Trade and Investment Measures* (mid-October 2011 to mid-May 2012), World Trade Organization, OECD and UN UNCTAD, May 31, 2012.

² “A staggering increase in protectionism around the world” is noted in the *Ninth Report on Potentially Restrictive Measures*, European Commission, June 6, 2012.

³ *Débâcle: The 11th GTA Report on Protectionism*, Global Trade Alert and Centre for Economic Policy Research, June 2012.

A rising tide of trade restrictions broadly lowers jobs and output

Change in jobs and GDP



“What if”

... Quality of urban life attracts people and businesses?

The businesses and professionals that build cities often have choices: They can vote with their feet, domestically and often internationally, following their urban bliss to whatever city attracts them with the best quality of life in which to work, start families, put down roots, or locate businesses. It makes intuitive sense that the three telltales of quality of life among the 10 *Cities of Opportunity* indicators—health, safety and security, demographics and livability, and sustainability and the natural environment—could drive business and personal decisions that directly affect the growth of cities.

An interesting cross-section of those we spoke to this year agree. Bill Bratton, former New York and Los Angeles head of police; David Miller, former Toronto mayor; and Andrew Chan, deputy chairman of Arup engineers and designers based in Hong Kong, mirrored each other in stressing the preeminence of health, safety and security as a foundation for strong cities in the mature and emerging world alike (see pages 52, 64, and 68 for excerpted interviews or www.pwc.com/cities for full-length discussions and video). This priority applies beyond the privileged. A cab driver echoed the police chief, engineer, and mayor on why he

had come to New York 25 years ago from Bangladesh: “There is terrible corruption and little public security in my city. ... But what can we do? We are not politicians or powerful people. We just want to survive. ... That’s why people come here from all over the world. There is law and order.” Thinkers from Aristotle to John Stuart Mill agree, placing justice, law, and order at the cornerstone of a healthy community. On the empirical level, *Cities of Opportunity* correlations show that healthy housing tracks very positively with elements of a strong economy.

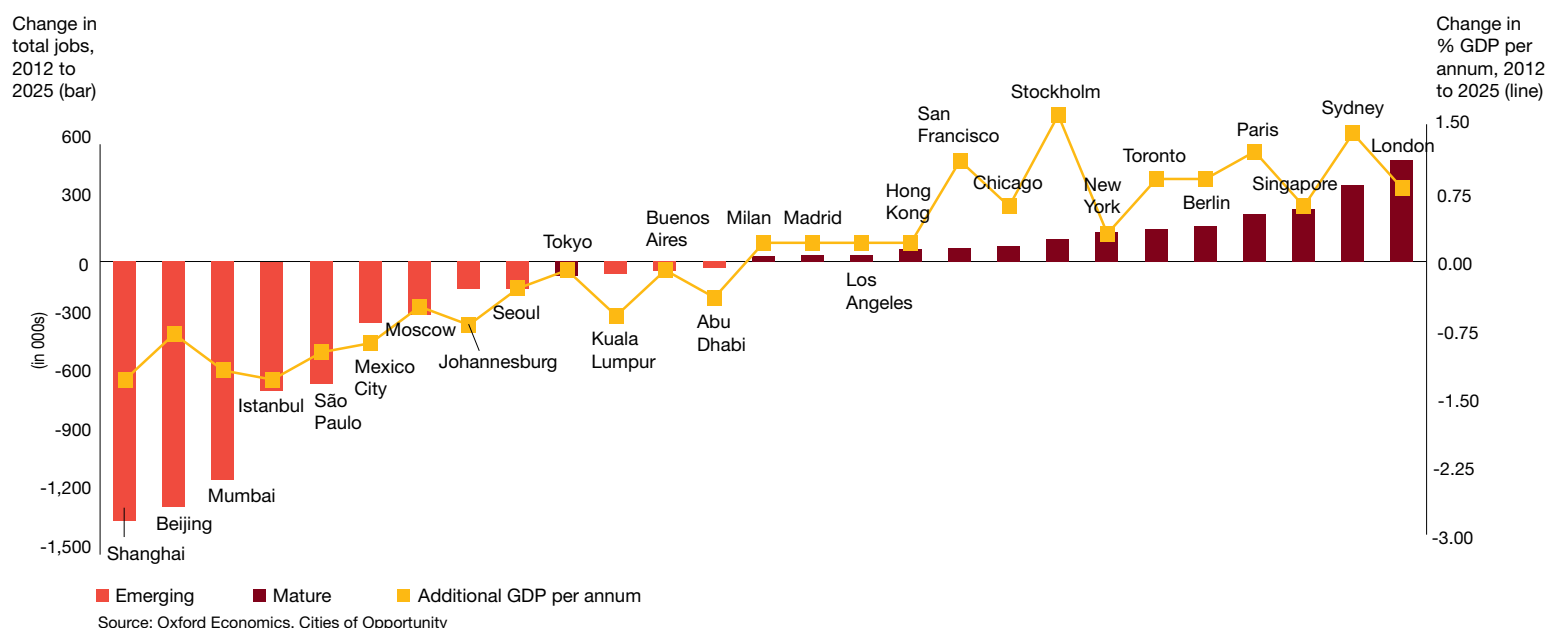
Robust demographics and livability add additional appeal. Cultural vibrancy, quality of living, well-managed traffic, a healthy working-age mix all have natural appeal to businesses and people. Paris, for instance, leads *Cities of Opportunity* in demographics and livability and comes in second only to Beijing in global economic clout—a testament to the balanced power that the “City of Light” retains even today in a world tilting ever eastward. When a sustainable and pleasant natural environment, with plenty of parks, is added into the mix, the makings of a magnetic city are understandable.

In this quality-driven world, most wealth is gained by mature cities that perennially lead our health, safety and security, demographics and livability, and sustainability indicators. Stockholm, the top performer overall in these three categories this year as well as last, enjoys the greatest boost in annual GDP at 1.6 percent—little surprise in the context of Stockholm’s natural beauty, outstanding social benefits, and the success of the Nordic model in today’s challenging times. Sydney, Paris, San Francisco, Toronto, and Berlin follow. Developing cities sacrifice the most wealth.

London again gains the most jobs at 520,000, given strong performance in the three indicators and its relatively high proportion of jobs in sectors of the economy that are most influenced by quality of life (such as health and high value-added service sectors). Sydney, Singapore, Paris, Berlin, Toronto, New York, Stockholm, and Chicago round out the top third. Most jobs are lost by emerging giants Shanghai, Beijing, Mumbai, Istanbul, and São Paulo, all still engaged in strengthening their own quality of life and infrastructure as populations and needs burgeon.

If we follow urban bliss, London and Sydney get a bounce

Change in jobs and GDP



Expect the unexpected

Preparing for a range of possibilities

The “what if” scenarios offer no Ouija board to foretell the urban future. Quite the opposite: They show the wide range of reasonable outcomes that may await cities over the short-term planning horizon.

The different pathways make an important point: Flexible thinking is needed. Continued city growth and expansion are anything but a given in a world facing big question marks in technology, economics, employment, politics, climate, population, demographics, and social cohesion.

Mature cities like New York and London that have been so successful in recent years (in fact, poster towns for the urban renaissance) could contract painfully. Big emerging cities could see their growth sidetracked. But innovation, education, connectivity, trade, and travel also open the door for healthy expansion.

Optimism tempered with pragmatism is a good outlook today for all the planners and stakeholders in urban transportation, energy, water and waste, education, healthcare, and security systems worldwide.

Comparing the “what if” scenarios: In good times, London makes Olympian strides, but the emerging megacities slow their pace

Difference from 2025 baseline employment projection (000s)

	An educated, connected world page 32	Trade booms in an educated, connected world page 33	Technological job loss and slow growth page 34	Protectionism spreads to counter hard times page 36	Quality of life spurs city growth page 37
Abu Dhabi	-70	-9	-100	-50	-30
Beijing	-800	1,110	-2,400	-1,620	-1,250
Berlin	-30	160	-340	-160	180
Buenos Aires	-590	-220	-480	-310	-50
Chicago	80	230	-250	-120	80
Hong Kong	8	300	-660	-250	60
Istanbul	-450	160	-990	-570	-660
Johannesburg	-390	-150	-420	-200	-140
Kuala Lumpur	-90	20	-190	-90	-60
London	830	1,640	-1,130	-690	520
Los Angeles	30	170	-320	-120	40
Madrid	-30	110	-270	-120	30
Mexico City	-500	-150	-700	-300	-320
Milan	-100	40	-160	-120	30
Moscow	-410	210	-1,030	-530	-270
Mumbai	-1,300	-640	-940	-560	-1,120
New York	380	790	-830	-340	150
Paris	210	470	-360	-220	250
San Francisco	30	95	-110	-50	70
São Paulo	-1,300	-460	-1,340	-730	-630
Seoul	330	840	-920	-430	-140
Shanghai	-620	1,080	-1,860	-1,430	-1,330
Singapore	100	590	-640	-420	270
Stockholm	50	140	-110	-70	120
Sydney	30	330	-510	-260	390
Tokyo	530	1,200	-1,110	-570	-70
Toronto	7	190	-230	-150	170

Source: Oxford Economics, Cities of Opportunity



The cities weave a surprising tapestry of jobs

Continued from page 29

to the grimy, represent the fabric of our cities and the biggest employment generators. The export sectors that they nurture drive the economy outwardly and bring in money.

Interesting trends and anomalies surface looking at individual cities. For instance, retail plays a very large role in certain cities—Hong Kong, Kuala Lumpur, Moscow, Mumbai, and Mexico City, among them—perhaps because of productivity improvement opportunities. Healthcare employs 16 percent of New Yorkers, possibly because of similar challenges in productivity, as well as the high relative wealth that can be invested in health services. (If New York’s healthcare employment rate were projected onto the six cities with the least healthcare employment in *Cities of Opportunity*, 3.2 million jobs would be generated in Beijing, Istanbul, Singapore, Kuala Lumpur, São Paulo, and Milan.)

Viewed together, financial and business services form the backbone of many city labor markets. That tandem employs over one in three workers in Milan, Paris, London, Beijing, San Francisco, and Stockholm, and at least one in four in Chicago, Toronto, New York, and Buenos Aires. (These two categories broadly include financial intermediation and auxiliary activities as well as insurance in financial services. Business services embrace real estate, research and development, architecture and engineering, legal, accounting and tax consultancies, advertising, and other professional services such as scientific and technical, as well as IT and computer services.)

Vulnerabilities and opportunities jump out in certain sectors. Public administration jobs are threatened as city and national governments consider austerity measures. Retail workers in mature cities have to wonder when a robot might stock the shelves or make fashion recommendations, or when online buying will simply shutter storefronts. Healthcare jobs

could suffer much the same way if major productivity improvements like virtual care take hold.

Even more sobering are the challenges of funding the basics of good housing, health-care, infrastructure, and education to keep up with the expanding urban world. Investment outlays required from 2012 through 2025 to support our baseline projections of future growth reach about \$2.5 trillion in New York, about \$2 trillion for Beijing and Shanghai, and around \$1 trillion in Tokyo, London, Sydney, and São Paulo. (See chart, “Forecast of investment spending relative to growth,” page 81.)

The importance of all these employment sectors, the potential for disproportionate job losses, and the uphill climb to fund city growth all bear consideration by the stakeholders in the future of urban well-being. At the same time, growth brings opportunities and the rapidly urbanizing world holds out enormous potential.

Investment outlays required from 2012 through 2025 to support our baseline projections of future growth reach about \$2.5 trillion in New York, about \$2 trillion for Beijing and Shanghai, and around \$1 trillion in Tokyo, London, Sydney, and São Paulo.



Times Square in New York.

The city today





Chuo Avenue in Tokyo's Ginza section.

Shanghai and Beijing are pushing ahead, while Western cities continue to compete

Our 10 indicators have undergone substantial revision this year and are now composed of 60 variables. As we do every year, however, we have “fleshed out” our quantitative research with several interviews with leading specialists and recognized authorities from all over the world.

Intellectual capital and innovation saw only a single change in its variables this year, and Stockholm and Toronto once again topped the rankings.

Technology readiness proved to be a very competitive indicator, with cities from three continents in the top 4 and Seoul ranking first overall.

Transportation and infrastructure underwent a fundamental reorganization this year. The focus is now sharply on the role of transportation and infrastructure in integrating a city, and in bringing people together efficiently but also in a manner that deepens the urban experience. Because of the extensive revision to the indicator that notably placed airport traffic and connectivity into the city gateway category, the rankings have also changed dramatically this year. Four of the top 5 cities are Asian. Last year, the top 5 were American and European.

Health, safety and security remains precisely as it was last year and, consequently, produces the same results: Stockholm and Toronto remain on top.

Sustainability and the natural environment, as its new name indicates, has also changed substantially. It keeps only two variables from last year, as it now includes elements of the natural environment in its overall measurement of urban sustainability. Sydney does even better this year than it did in 2011, topping the ranks, while Berlin remains in the top 4.

Economic clout has also undergone major revision. Only four variables remain from last year and several are gone. And yet, Paris, London, and New York are still in the top 5, as they were last year—except that Beijing now tops the ranks and is joined in the five best-performing cities by Shanghai.

Ease of doing business has seen some modification in its variables this year, but very little change in the final results, with the top 5 remaining virtually the same: Singapore and Hong Kong swapping the top spot, followed by New York, London, and Toronto.

Cost also saw a significant renovation, adding four new variables, with the result being Berlin ranking first and the next five cities—Seoul, Kuala Lumpur, Istanbul, Mexico City, and Johannesburg—all coming from the developing world.

Demographics and livability's focus this year is very much on livability, as measured by three of its four variables. Paris takes top spot this year replacing Stockholm, with Sydney, Toronto, and San Francisco remaining high performers.

City gateway is the one completely new indicator in this year's study. It seeks to measure a city's global attraction. Interestingly, as with economic clout, Beijing and Shanghai once again join London, Paris, and New York in the top 5.

Learn more

See www.pwc.com/cities for interactive modelers; videos, podcasts, and full-length versions of the interviews; detailed data definitions and sources.

Intellectual capital and innovation

Generating the skills that generate growth

Of the 10 indicators in our study, intellectual capital and innovation consistently attracts the attention of a wide range of readers. And that is precisely because, in a modern and global economy, it is almost axiomatic that intellectual capital, and the innovation it generates, is the engine of both social development and economic growth.

As it is so critical, *Cities of Opportunity* continually strives to ensure as accurate an assessment of this indicator as possible. Last year, we made a number of changes; this year, we made only one—but it was significant. Percent of gross domestic expenditure on R&D has been replaced with the Innovation Cities Index. This provides a more accurate picture of each city’s actual “innovativeness” than the previous country-level measure (which gave all five US cities an equal rank in last year’s results, for example). In addition, the rankings in the current variable are based on an index of 162 different statistical components, so the ensuing results are both broader and deeper.

Still, there is little difference in this year’s overall rankings, as Stockholm and Toronto once again finish first and second, respectively. Although there seems to be a marginal degree of slippage for Stockholm from last year—when it ranked first in three variables (including the now superseded R&D category), as opposed to finishing first this year in only two—what is more worrisome for the Swedish capital is, again, its result in math/science skills attainment. Last year, it just missed ranking in the top 10 by only one place; this year, however, it ranks number 13, tied with the four American cities in this country-level measure.

Toronto, however, is even more impressive this year at number two than it was in 2011, finishing in the top 10 in all nine variables in this indicator. Paris also finished very well this year, replacing New York in third place. All four US cities finished in the top 10 again, as did Tokyo, although the Japanese city fell three places from last year.

Tokyo was again the only Asian city to break into the 10 best in this indicator. The Asian cities’ remarkable results in math and science skills, however, might be a sign of substantial advances to come, as they swept the top six places in this variable. Moreover, three Asian

	Classroom size ¹	Libraries with public access	Math/science skills attainment*
27 Stockholm	21	27	15
26 Toronto	25	22	21
25 Paris	18	17	17
24 San Francisco	20	21	15
23 New York	15	18	15
22 London	13	24	18
21 Sydney	17	26	20
20 Los Angeles	22	15	15
19 Chicago	16	19	15
18 Tokyo	9	20	22
17 Hong Kong	8	11	26
16 Berlin	19	4	19
15 Seoul	7	12	23
14 Milan	26	14	10
13 Singapore	5	5	26
12 Madrid	24	10	9
11 Moscow	27	23	8
10 Shanghai	3	8	27
9 Abu Dhabi	14	7	6
8 Beijing	3	2	24
8 Mexico City	24	25	4
6 Kuala Lumpur	6	9	7
5 Buenos Aires	12	13	2
4 São Paulo	11	6	3
3 Johannesburg	1	16	1
2 Mumbai	4	3	16
1 Istanbul	10	1	5

cities ranked in the top 10 in research performance of their leading universities, making it clear that Asia knows what it needs to do to achieve competitive ranking in this area.

Finally, in a near reprise of our previous study, the 10 cities at the bottom of the rankings are home to some of the most potent economies in the world, with annual growth that, in most cases, has left the cities in developed economies trailing behind year after year. Their results here confirm, however, that if they are to really become competitive with the historically (and still) dominant cities of Europe, North America, and Asia, they have no choice

but to build, or enhance, the intellectual infrastructure that will make that possible. It is admittedly a difficult task, but certainly doable, as many of these cities have long and distinguished histories of their own. It might, however, require the assistance of national governments, as with Brazil’s Science Without Borders scholarship program, which hopes to train 100,000 additional engineers and scientists by 2015 at many of the finest universities around the world.¹

¹ See “Education in Brazil: Studying the world,” *The Economist*, March 17th-23rd, 2012.

Literacy and enrollment ^{2*}	Percent of population with higher education	Research performance of top universities	Innovation Cities Index	Intellectual property protection*	Entrepreneurial environment*	Score
26	26	19	18	26	27	205
25	20	18	24	21	22	198
24	25	22	26	25	20	194
23	27	15	27	17	26	191
23	24	26	25	17	26	189
18	19	27	23	24	18	184
27	11	17	19	20	22	179
23	17	23	13	17	26	171
23	21	21	12	17	26	170
19	22	25	17	19	14	167
10	13	20	21	22	19	150
17	15	16	22	23	12	147
15	16	24	14	10	16	137
14	12	13	20	7	15	131
9	6	11	15	27	18	122
16	18	9	11	11	11	119
13	23	7	4	2	2	109
3	14	10	16	9	9	99
8	9	2	9	18	14	87
3	10	12	10	9	9	82
7	5	8	2	4	3	82
4	8	2	8	12	10	66
12	7	6	4	1	6	63
11	3	14	6	5	1	60
6	1	4	1	13	6	49
1	4	5	5	6	4	48
5	2	3	7	3	9	45

Each city's score (here 205 to 45) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

■ High Highest rank in each variable
■ Medium *Country-level data.
■ Low

1 Where average class size data were unavailable, pupil-teacher ratios, or the number of students divided by the number of teachers in primary education, were used as substitutes.

2 Measurement of a country's ability to generate, adopt, and diffuse knowledge using data from the World Bank's Knowledge Index category, education and human resources. The variables that compose education and human resources are adult literacy rate, secondary education enrollment, and tertiary education enrollment.

City gateway

A new indicator measures a city's global connection

City gateway is the only indicator in the study that is altogether new. It also serves a control function for the results in the demographics and livability indicator. In fact, it is best to read the rankings here in conjunction with the rankings in demographics and livability (see page 67)—and vice versa.

Above all, this indicator attempts to quantify a city's global connections and attraction beyond its local borders. By measuring a city's global draw, city gateway reflects the actual reality of today's networked world and takes the pulse of a city's social, economic, and cultural magnetism internationally.

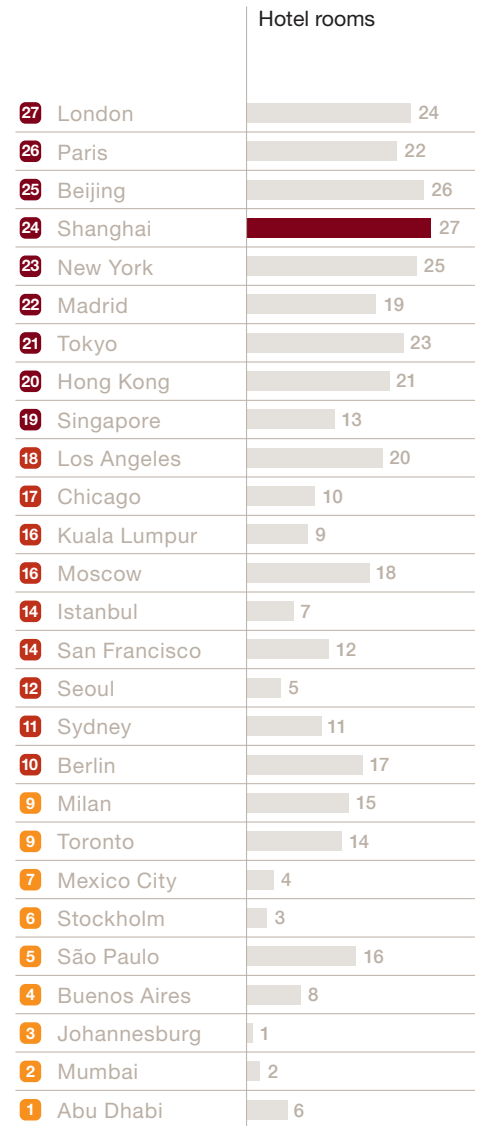
In that light, the rankings are revealing. There is no surprise in London clinching first place, given the city's function as a hub of European travel (sustained by its four airports). What is surprising is how, in coming a very close second, Paris not only does very well across the board in this indicator, but also beats out English-speaking London and New York, as well as famously business-friendly Singapore, for the top rank in international association meetings. What is equally surprising is that London, Paris, Beijing, and Shanghai beat New York in this indicator.

When it comes to the world's most attractive cities for tourists, the popular Western consensus has long accepted the trinity of London, Paris, and New York. But despite placing first in aircraft movements and second in passenger

flows, New York is hampered by poor airport to central business district access (especially for a city that likes to consider itself the center of the contemporary world) and unexpectedly weak appeal to organizers of international meetings.

While city gateway measures attractiveness to the outside world, demographics and livability represents the other side of the coin, judging a city's quality of life through the experience of its own citizens. The cities that do well in both indicators combine global and local vitality and attractiveness; appealing globally but still acting locally. London, Paris, Hong Kong, and Singapore are the only cities that score in the top third in both measures. Paris does particularly well, narrowly finishing second to London in city gateway and finishing first in demographics and livability.

It is also possible to consider that city gateway may function as a leading indicator. For instance, Beijing and Shanghai have quickly attained significant global presence, but achieving balanced and long-lasting vitality will also mean addressing the needs and desires of their own residents.



International tourists	Number of international association meetings ¹	Aircraft movements	Incoming/Outgoing passenger flows	Airport to CBD access ²	Score
27	23	25	27	19	145
23	27	23	23	25	143
17	24	19	22	27	135
19	13	21	21	22	123
24	9	27	26	10	121
16	21	17	16	26	115
15	15	20	25	13	111
21	17	10	17	22	108
26	26	9	13	12	99
20	4	24	20	4	92
1	8	26	24	19	88
25	16	7	11	19	87
18	5	18	18	10	87
22	19	15	14	8	85
14	6	22	15	16	85
9	22	13	19	14	82
6	14	11	12	23	77
13	25	5	5	7	72
5	7	12	8	22	69
12	10	16	10	7	69
10	11	14	6	12	57
11	20	3	3	15	55
4	12	8	7	3	50
8	18	2	2	3	41
3	2	4	4	25	39
7	3	6	9	3	30
2	1	1	1	5	16

Each city's score (here 145 to 16) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.



¹ A cumulative count of international association meetings per city per year that take place on a regular basis and rotate between a minimum of three countries from 2005 to 2010. Figures are provided by members of the International Congress and Convention Association.

² A measure of the ease of using public transit to travel between a city's central business district and the international terminal of its busiest airport in terms of international passenger traffic. Cities with direct rail links are preferred to those with express bus services. Cities with rail links with the fewest transfers are ranked higher than those with more.

Cisco's vision of cities transformed by technology spreads

... from Wim Elfrink's passage to India into a surrounding world of urban possibilities



In 2006, Wim Elfrink was named the first Chief Globalisation Officer at Cisco Systems, the networking equipment giant. Instead of basing himself in the company's California headquarters, Elfrink made a radical decision: He moved to Bangalore and established a second Cisco headquarters in one of the world's fastest-growing metropolises. Now back in Silicon Valley, Elfrink continues to lead Cisco's globalization strategy, its entry into new emerging markets, and its Smart + Connected Communities initiative. Here, he discusses the challenges of urbanization and the power of technology to transform cities in ways we can barely imagine.

Why did you decide to create a second headquarters in India after taking charge of Cisco's globalization strategy?

A lot of companies look at India because of its low labor costs. We looked at India for business opportunities, access to new talent, new markets, new partners. India is English-speaking, democratic, has a good legal system, IP protection, a collaborative government, and big internal markets. In a decade, one in three workers in the world will be Indian. Its population is also getting younger, and 20

million people are joining India's middle class every year, which means you add an Australia to the market each year. If you draw a circle of countries within a five-hour flight from India, you can reach 70 percent of the world's population.

How did living in Bangalore change your perspective on the challenges facing cities?

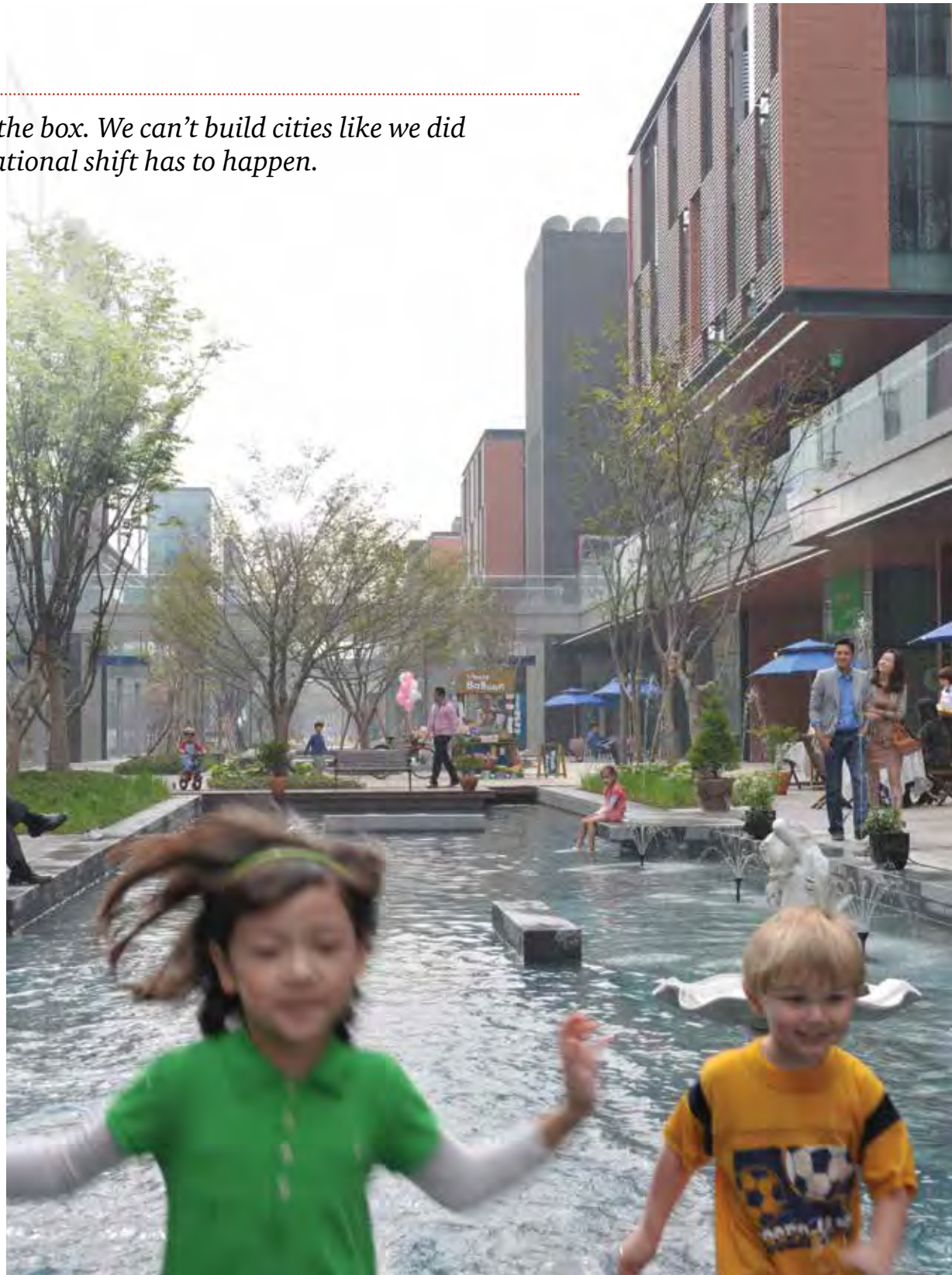
We had a unique opportunity because we were building a new campus there for 10,000 people. In India, you have to provide healthcare, transport, and education to your employees. So we developed a whole vision of this campus as a city of the future. Bangalore became the center for what we initially called "intelligent urbanization," which morphed into our concept of "Smart + Connected Communities." It was also in India that I really started to understand what urbanization is all about. In the next decade, more than 100 million people will move from rural areas to urban areas in India alone. In total, 700 million people globally will urbanize in the next decade. That's 190,000 a day. If you're in the middle of that, you start to understand what the challenges are. In India, where you're dealing with a lot of poverty and illiteracy, how do you give people access to education and healthcare, create jobs, and give people decent lives? Perhaps the biggest lesson was that you have to think out of the box. You can't think about all these challenges in

a traditional pattern. We can't build cities like we did in the past. A transformational shift has to happen.

What innovative projects is Cisco involved with in India?

There's a master plan with a budget of around \$90 billion to create a transport line between Delhi and Mumbai, then to create 24 new cities around it. Cisco has been awarded with the master ICT [information and communications technology] plan for two of these cities. And that's new: ICT in city planning has always been an afterthought. But now you see conglomerates starting to work together, with technology central in their awareness. Elsewhere in India, we're working with a developer that's building 25 million square meters of apartments and shopping malls. In the first phase, we're establishing real connectivity from the home. It's a triple play: home automation, energy management, and entertainment. Many Indian families have parents living with them, so you also need to consider assisted living and access to healthcare. We've identified a portfolio of services you can buy for so many dollars per square meter. We're used to the idea of getting gas, water, and electricity in our homes. In future, we envision that technology will be built in, so you won't buy it, but will have more and more services available to consume. You could even think of ICT as the fourth utility.

You have to think out of the box. We can't build cities like we did in the past. A transformational shift has to happen.



The first phase of Songdo International City Development, with Cisco Smart + Connected Communities' home networking systems and TelePresence, opened in Incheon, South Korea, in 2009.

You define urban sustainability in a holistic way, including economic, social, and environmental factors. What's the priority in a city like Mumbai?

There has to be a balance over time between economic, social, and environmental sustainability. Depending on the most urgent needs, where do you start? For people in Mumbai, giving them security, safety, a place to live, a good sewer system, access to utilities, is the priority. In more developed cities, you're at a different phase. Take Detroit, where the population has gone down from 2 million people to 700,000. The question there might be: How do you attract new investors and start new industry? The starting points are different. But, in the end, you want to look holistically at all three of those elements of sustainability.

What role will technology play in transforming urban life?

From a technology point of view, we see two megatrends on top of broadband. One is what we call the "Internet of Things." Everything will be connected. We forecast that there will be

50 billion devices in the next decade; and we'll have three billion people connected to the Internet. The other trend is that everything will be cloud-based. This will create new opportunities and business models that we've so far only dreamed of. Technology can be a key enabler to transform societies by giving people affordable access to cloud-based services.

How is technology changing the way people work in cities?

In the past, cities were built for work—you'd go to a city to work. But work is now being virtualized. I can work anywhere. You don't commute to compute. You go to meet people and collaborate. So the whole nature of work is changing, and you're seeing new concepts coming up in terms of technology-enabled work methodologies. Amsterdam is a fantastic showcase for what we call "Smart Work Centers," which provide a work environment that bridges the gap between a central office and a home office. By locating these centers close to urban areas, we're starting to decentralize work. So you reduce transport, improve utilization, and share infrastruc-

ture. This is happening in Korea and France, too. Best practices are spreading around the world.

Will technology change the way we collaborate?

Urban planners often say you need an environment in cities where people come together, eat together, where a cluster of activities comes together—then innovation will happen. You had this in Paris, with art; in New Orleans, with music; in Silicon Valley, with technology. But now you can also create clusters virtually. I can set up a community of experts in five minutes. It's not just that I go to a pub or restaurant to meet people. This will mean you can start innovation in different types of environments, which will become more and more virtualized.

Is technology dehumanizing our lives by eliminating the nuances of face-to-face or even voice-to-voice communications?

Technology is a great enabler. It doesn't replace. It replaces partly, and it adds. It gives us a bigger toolkit. I love to meet people and have brainstorming sessions. I love

listening to voicemails because, in voicemails, you hear emotion. These things serve different purposes. But the world will increasingly move to connectivity; social networking is happening. We have to embrace it, make it a tool, and use technology to enable new opportunities.

Should there be more emphasis on the public good in urban planning?

In future, there will be more competition between cities. Cities will compete for work, investors, and talent. So, urban planners have to ask questions like: How can we attract more young people and make people feel safe? You'll also see more cities with integrated operations centers. With everything becoming connected and all that "Big Data" available, you'll get more real-time scenario planning: If you have a thunderstorm and need to close an airport, you can say, "Perhaps we should also let the children go home now, inform schools, reroute traffic." These operations centers will cut costs and make cities more productive. You can also monetize these data via mobile applications. The

Urban planners say you need an environment in cities where people come together, eat together, where a cluster of activities comes together—then innovation will happen. You had this in Paris, with art; in New Orleans, with music; in Silicon Valley, with technology. But now you can also create clusters virtually.

By 2017, over 300,000 will either live or work in Songdo International City Development in Incheon, South Korea.



average Parisian spends four years of his life finding parking spaces; would he pay 10 euros a month for a service that made this easier? This type of intelligent infrastructure will be the new norm. Greenfield cities will be built that way. So, cities that want to compete will have to arrive at that new norm.

How will these technological innovations help cities cut costs?

Just look at what new technology can enable in city governance. About 70 percent of the energy in the world is used in cities, 40 percent of that in buildings. But buildings have only 40 percent utilization. So, if you can improve utilization, a 30 percent energy saving is simple. Or look at the reduction of traffic you can achieve through different ways of working, Smart Work Centers, better planning. With cloud-based computing, you can give people access to education for \$3 a month. If you think about healthcare, 80 percent of doctors' calls don't need physical interaction. In future, more diagnostics will be done remotely, so you'll only

see your doctor for an intervention. Politicians buy in because they see the benefits—and need to provide thought leadership to get reelected.

Tell us about your work in London.

I love cities with deadlines. If you're hosting the Olympics, you know you have to make progress. For us, in the neighborhoods where you have the Olympics, the real work starts after the games. How will the Olympic Village be sustainable? How will we make that a Smart Work Center? How can you transform stadiums so they serve multiple functions? If you add technology, can you make them profitable for the next decade, not just for one event? It's a different way of thinking.

Where is globalization heading?

We're in the fourth phase of globalization. Columbus discovered the New World; Vasco da Gama discovered the way to the East. Then we started trading for centuries. Then, at the end of the 20th century, we started to outsource work, manufacturing, R&D. Now, in the fourth phase, we're

looking at the globalization of the corporate brain. Where's the most expertise for supply-and-demand value chains? Probably Asia. So, you see many companies having a head of supply-chain management there. I'm always looking at clusters because innovation comes in clusters. And I look at how we can participate in these innovation centers.

In envisioning the future, you've said that it helps to think more like children. Why?

If I look at how my children learn, work, and communicate, it's dramatically different from the way that Generation 50-plus thinks. So I think urban planners have to look more through the eyes of children. I was 14 when we got a black-and-white television at home. So, if I'm not careful, I become a prisoner of my own experiences. Then I won't think out of the box.

How has living in India changed you and your family?

It was humbling to see the extreme poverty, the malnutrition, the people living on the streets,

and to see them still valuing life and being happy. That has dramatically changed our lives. It's made us more humble. It also further develops your community feeling and deepens your sense that your company has a corporate social responsibility. As a technology company, you're giving people access to healthcare and education, and helping to create jobs; you're not just selling what you have, but creating what people need. For my kids, it's been life-changing, too—to understand that the world is big and complex, that there are a lot of unmet needs, and that, as a human being, you have a social responsibility to contribute.

Learn more

Video clips from this condensed conversation are available at www.pwc.com/cities, as is a full-length print version of the entire, much longer discussion.



Technology readiness

The competition for digital advantage continues to intensify

This indicator has seen an interesting reordering of positions in the top 10 this year. While this fact might just be the result of short-term developments, it might also presage longer-term trends.

Seoul, which came in second last year, has overtaken New York at the very top of the rankings. But instead of simply switching places with the Korean city, New York has

dropped to third place, behind San Francisco—which climbed two places from fourth last year. In so doing, the northern California city has also passed ahead of Stockholm, which drops to fourth this year from third in 2011. Moreover, while Hong Kong has dropped three places to tenth this year, Tokyo has risen three places, jumping from ninth last year to sixth this year. London, too, which just missed the top 10 in 2011, tied Los Angeles this year for eighth place, safely inside the group of 10 best.

Basic, but intriguing, consistencies with last year's data remain, however. Stockholm is still the only non-Asian city to reach the top ranking in any variable in this indicator, ranking first, as it did last year, in both Internet

access in schools and digital economy score. Meanwhile, Seoul continues to outrank every other city in broadband quality, as does Tokyo in software and multi-media development and design. This year's results continue to raise the question that was obvious last year: Why does Stockholm score so low in development and design, the only variable in which it does not rank first or second? A possible answer is its relative lack of success in attracting foreign technology firms, which is also reflected in its low Foreign Direct Investment (FDI) figures in the economic clout indicator. Everything else being equal, Sweden's capital would easily rise to number one in this indicator if it were simply competitive in this variable.

	Internet access in schools*	Broadband quality score	Digital economy score*	Software development and multi-media design ¹	Score
27 Seoul	25	27	18	26	96
26 San Francisco	20	22	26	25	93
25 New York	20	22	26	23	91
24 Stockholm	27	26	27	9	89
23 Chicago	20	23	26	12	81
22 Singapore	26	15	21	18	80
22 Tokyo	12	25	16	27	80
20 London	24	14	17	24	79
20 Los Angeles	20	17	26	16	79
18 Hong Kong	23	18	22	8	71
17 Toronto	22	12	19	13	66
16 Paris	9	20	14	22	65
15 Sydney	21	13	20	2	56
14 Moscow	8	24	1	21	54
13 Beijing	16	9	4	20	49
12 Berlin	11	19	15	3	48
12 Shanghai	16	9	4	19	48
10 Madrid	10	11	13	10	44
9 Kuala Lumpur	13	3	10	15	41
8 Milan	5	10	12	7	34
7 Istanbul	7	16	6	4	33
6 Abu Dhabi	14	2	11	1	28
6 Buenos Aires	1	5	5	17	28
4 Mumbai	6	5	2	14	27
3 Mexico City	4	6	8	6	24
2 Johannesburg	2	1	9	11	23
1 São Paulo	3	7	7	5	22

Each city's score (here 96 to 22) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

¹ The combined indices gauge a city's performance using quality (weighted 70%) and cost (weighted 30%) assessments of the location, as well as 120 qualitative competitiveness measures. For software development, these measures include availability and track record in ICT; availability of specialized-skills professionals such as scientists and engineers; access to venture capital; R&D

capabilities; software exports; quality of ICT infrastructure; and specialization in software development. For multi-media design, measures include the size of the location's leisure and entertainment sector; its specialization and track record; information technology infrastructure; quality of life; and skills availability.

■ High ■ Highest rank in each variable
■ Medium ■ *Country-level data.
■ Low

Health, safety and security

From Aristotle to Bratton to Chan, securing citizens' well-being is key

“Man when perfected is the best of animals,” Aristotle wrote in Politics, “but when he is isolated from law and justice he is the worst of all. ...” In the words of Kroll chairman and the only man to have led both the New York and Los Angeles police departments, Bill Bratton, *“If you don’t have security, and you don’t have health and safety, all the other pillars that support democracy will weaken, including education and the economy. If you have a shaky platform, they are all going to be shaky.”* Dr. Andrew Chan, deputy chairman of the Arup Group of global engineers and designers, agrees: *“For the average person in a developing city, the most important factor is safety, health, and security.”*

From ancient Athens to modern New York and Hong Kong, there appears to be universal agreement on a city’s responsibility to its citizens’ well-being. As such, this section essentially tests civic viability, cohesion, and advanced socioeconomic achievement. Among all indicators in *Cities of Opportunity*, this one comes closest to actually quantifying the qualities that constitute urban “civilization”—the word whose very meaning is embedded in the notion of a city.

That is why this indicator also rewards long-term stability and relative affluence. After all, health, safety, and security were the reasons men and women originally gathered together

Continues on page 77

	Hospitals	Health system performance ^{1*}	End of life care ^{2*}	Crime	Political environment	Score
27 Stockholm	25	25	18	24	27	119
26 Toronto	21	22	24	24	25	116
25 Sydney	23	18	26	24	23	114
24 Chicago	26	15	24	24	20	109
23 San Francisco	24	15	24	24	20	107
22 Singapore	17	26	17	27	16	103
21 Berlin	11	21	25	18	26	101
20 New York	20	15	24	18	20	97
19 London	16	19	27	18	16	96
18 Milan	19	24	13	18	21	95
17 Abu Dhabi	27	16	16	27	7	93
17 Tokyo	4	27	14	24	24	93
15 Los Angeles	22	15	24	10	20	91
14 Paris	9	20	19	18	23	89
13 Madrid	12	23	12	18	16	81
12 Hong Kong	5	11	15	27	13	71
11 Seoul	7	17	10	18	9	61
10 Kuala Lumpur	14	5	9	18	9	55
9 Johannesburg	18	1	11	5	11	46
8 Buenos Aires	15	6	3	7	12	43
7 Mexico City	13	7	6	5	11	42
6 Shanghai	8	11	5	10	4	38
5 Beijing	6	11	5	10	3	35
4 Mumbai	10	2	1	7	5	25
3 Istanbul	1	8	8	5	2	24
2 Moscow	3	3	7	5	1	19
1 São Paulo	2	4	3	1	6	16

Each city’s score (here 119 to 16) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

1 Measurement of a country’s health system performance made by comparing healthy life expectancy with healthcare expenditures per capita in that country, adjusted for average years of education. (Years of education are strongly associated with the health of populations in both mature and emerging countries.)

2 Measurement of countries according to their provision of care for their citizens at the end of their lives taking into account the basic healthcare environment, availability, cost, and quality of care.

■ High ■ Highest rank in each variable
■ Medium ■ *Country-level data.
■ Low



Bill Bratton transformed law and order

... in New York and Los Angeles. Today, he says public safety is the most critical priority for any city—and explains how to achieve it.

As Commissioner of the New York Police Department from 1994 to 1996, William J. Bratton fought crime with legendary success, spearheading a national revolution in attitudes toward policing. Bratton adopted a “broken windows” community policing strategy of zero tolerance for minor offenses and championed statistical analysis to prevent crimes before they occurred. His seven years as Chief of Police in Los Angeles saw an equally impressive drop in crime rates. Now back in New York, Bratton is chairman of Kroll, the private security company. He recently co-authored a leadership book, *Collaborate or Perish!*

What’s the role of the police in today’s society?

We make neighborhoods peaceful. We help control behavior. We make things safe. Other societal problems can be dealt with more effectively when you don’t have fear, disorder, and crime. As a police chief, I think of myself as very much like a surgeon in a trauma center. A person is brought in from a horrific accident. You find out what’s going to kill this patient and what you must do to save that life. In the late 1980s,

many American cities were effectively dying, principally because of crime, which was causing people to flee, leaving behind the poor and dispossessed. Cities were being written off. But just as the patient seemed about to expire, it all began to change.

How did you save the patient?

A new philosophy of policing was embraced by many police chiefs, myself included. The medicine we used was community policing, with its emphasis on partnership. We also returned policing to its



Today, as chairman of Kroll.

founder roots—the idea that police exist primarily to prevent crime by our presence, activities, and visibility. In the '70s and '80s, police were told to focus not on preventing crime but on responding to it. We corrected that.

What's the secret of transforming crime-ridden neighborhoods?

Community policing and a focus on broken windows are essential. The concept of broken windows—taking care of the little things—was our lynchpin strategy in

New York and L.A. We will arrest people drinking in public who get drunk and then go after each other with guns and knives. We will not allow people to litter. We will have zero tolerance for quality-of-life crimes. At the same time, we will focus police resources on more serious crimes—the murders, muggings, rapes, and robberies—because, otherwise, it seems like a no-man's land. In the '90s, we got it right by having zero tolerance not only for major crime. However, if the government cleans the area up but the community doesn't help preserve it, you're not going to be successful.

How can the police encourage the community to help in high-crime neighborhoods?

Police have to go into these very dangerous neighborhoods and calm things down, handling the tough job of taking on the bad guys. You can't break the law to get them. You have to deal with them humanely. You can't beat them or wrongfully arrest them. That's critically important because even the good people in those neighborhoods aren't going to support you if they feel that these kids—who are their sons,

Policing is not a cost. It's an investment. If you don't have public safety, the money you're apportioning to libraries and parks is wasted: If people don't feel safe, they're not going to use them. If you make it safe, businesses will come and invest; jobs will be created.

nephews, and brothers—are unfairly treated. You also have to act consistently: You can't police differently in rich and poor neighborhoods, white and black neighborhoods. The mantra I'm known for is that you put cops on the dots: You identify where problems occur that create fear, disorder, and crime, and that's where you put your police. Unfortunately, that often happens in poor and minority neighborhoods. So it's critical that people there feel they're treated fairly and get their share of resources.

How beneficial was CompStat, a system that uses statistical analysis to allocate police resources?

Think of this from a medical perspective. You go to the doctor, and he runs a CAT scan over you to identify your illness. CompStat identifies the crime hot spots in a particular location, and that's where you want to put your cops. A doctor does a physical examination to identify a basal cell melanoma because he understands that you'll die if he doesn't start treating your illness right away. In the same way, CompStat identifies these crime problems as they're emerging—when there are

two or three incidents, not when there are 20 or 30 incidents and you're already dead. Fortunately, we had a lot of medicine to work with: In New York, we had 38,000 cops, and it took us one to two years to completely tip the city and turn it around. We had a lot less medicine in L.A.—9,000 cops—so it took me seven years to tip the city.

Given the huge problems confronting you in L.A., did you ever have second thoughts about taking on that management challenge?

On my first weekend there as Chief of Police, we had about 17 murders, and I was questioning what the hell did I get myself into. The police department was much more demoralized than in New York. It was incredibly small and had been literally at war with the African-American community for 50 years. There also was a horrific gang problem. In my first year in L.A., I think there were 676 murders. This year, there may be fewer than 300. So we took that terrible situation and turned it around. I believe in a leadership management system that I call the Christmas tree. You start with

a vision and surround yourself with people who believe it can be achieved; then spread it down the tree. Your team attracts others until, eventually, you find there's a tipping-point level where the rubber hits the road. In cities, that's usually the police captain, who's closest to the community and the cops and who's under a lot of pressure from the police structure above him or her. You give that person power and authority but hold them accountable. This system is teachable and will work in just about any city in America.

How do you develop a sense of inclusion and shared investment in a city as diverse as L.A.?

Cities are where people of all different types come together from different backgrounds, ethnicities, and countries to trade, to learn, to develop art. Tom Wolfe once wrote a wonderful piece explaining how artists are the first to recreate cities that are dying; Artists go into deserted neighborhoods, into

lofts, then attract patrons; then little coffeehouses and restaurants are established. The point is that cities are intended to allow for that socialization. But if that socialization is threatened, the revitalization of cities isn't going to happen. And how is it threatened? Crime and disorder. That's where the police come in. In a democracy, the first obligation of government has to be the rule of law, to ensure your physical safety and that contracts are enforced. These two things that hold humanity together—the ability to coexist in peace and engage in relationships based on contracts that can be legally enforced—are the foundations of democracy. And cities are the catalysts for these things.

How should today's cash-strapped cities view the vast cost of effective police work?

Public safety is the first obligation of government in a democracy. Policing isn't a cost. It's an invest-

ment. If you don't have public safety, the money you're apportioning to libraries and parks is wasted: If people don't feel safe, they're not going to use them. If you make it safe, they will come. Businesses will come and invest, jobs will be created, more taxes will be paid, more schools will be built, more policemen will be hired.

Do megacities present particular policing challenges?

Everything is scalable. But the problem is that the megacities have tended to grow up in some of our most impoverished countries where the rule of law is not as firmly established as in, say, the Western democracies. Also, a lot of the basic services that help to deal with human needs are not available there. So if you look at those cities with enormous populations, all of them are struggling to deliver basic quality-of-life services, and none of them are delivering a satisfactory police ser-

vice or public safety. Sometimes the issues are too big. New York was tough enough in the 1990s with 8 million people. Imagine how challenging Mexico City is with 20 million.

Are gangs the same in different types of cities, whether it's Mexico City, New York, L.A., or London?

There are some commonalities in that gangs always exist because of a need. And that need is socialization, the desire to belong, the desire to be part of a family.

What did you make of the police response to the London riots?

Britain's government recently came out with a report that was pretty strong in its criticisms of the Metropolitan Police for its failure to respond quickly enough and forcefully enough. The good news is that the police will learn from that. Months after the riots, they were still arresting people and making every effort to identify everybody they could, which sends

Cybercrime is the crime of the moment and the crime of the future. The capability to cause phenomenal havoc—financial, personal, economic, or among nations—is very real.

Back in the days of black-and-white pictures and perceived black-and-white issues, Commissioner Bratton (left) earned his stripes as Boston's transit police chief in the early 1980s.



Cities are intended to allow for socialization. But if socialization is threatened, then the revitalization of cities is not going to happen. And how is it threatened? Crime and disorder. And that's where the police come in.

a strong message that if you engage in this behavior in the future, you'll be punished severely. That's very important: In a democracy, you must have punishment for offenses.

How significant is the impact of social media on urban violence and protest?

Social media played a significant part in the London riots. The Arab Spring is a clear example of the potential impact. Identity theft also is an impact of social media. The loss of privacy is another. In addition, see these pop-up mobs in different American cities. On the plus side, it's very helpful to us in solving crimes. Oftentimes, the criminal provides all the evidence we need through use of the social media. I don't think we fully understand yet the scope or the potential of it, both good or bad. But we are learning very quickly.

New technology poses an enormous challenge in terms of cyber-spying. How significant are the threats?

We're at tremendous risk. At my company, Kroll, we are rapidly expanding our cyber-security activities and our data-breach protection. It's the crime of the moment and the crime of the future. The capability to cause

phenomenal havoc—financial, personal, economic, or among nations—is very real. It is a growing problem, and a lot of resources are being put into play to address it.

Looking at the 10 indicator categories we survey in this report, which ones seem most important for the long-term future of cities?

Health, safety, and security is the number-one requirement. If you don't have security, you don't have health and safety, and all the other pillars that support democracy will weaken, including education and the economy. Transportation infrastructure also is important: People in huge, emerging cities often travel incredible distances to work with incredibly poor transportation systems. Also, ease of doing business is critical. In L.A., they're so anti-business: The regulations smother you to death. I had lots of friends who were trying to create businesses there, and the regulations were such a disincentive. But for me, public safety still is the most critical issue. We're in the midst of the greatest recession since the Great Depression, and how do you describe American politics at the moment? It's a total disaster area. But crime has been down in the US for four and a half years in a row. So at this time of

great despair, the one positive thing we have going for us is that foundation of safety.

Did you want to become a policeman when you were a boy?

My earliest memories were growing up with TV shows like "Dragnet" and "Adam-12" and wanting to be a policeman. Fortunately, life was very kind because I was able to get into it and go in a lot of interesting directions. It's a very rewarding profession because every day you can have a life of significance. Every day, if you get it right, you can have an impact on so many people.

Learn more

Video excerpts of this condensed conversation are available at www.pwc.com/cities, as is a full-length version of the entire, much longer discussion.

Transportation and infrastructure

A major revision focuses on internal mobility and the city dweller’s experience

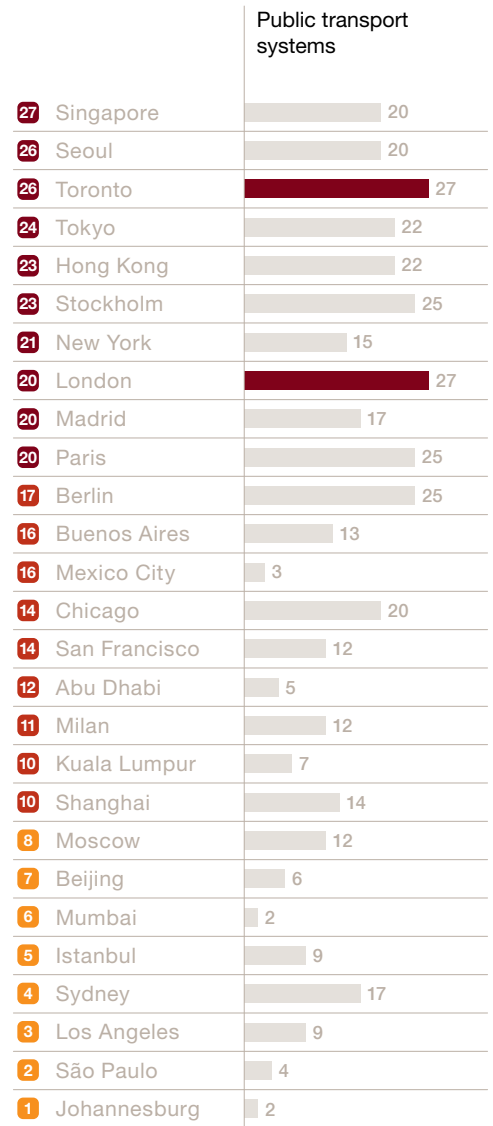
After a fundamental reorganization and restructuring to better reflect a city’s transportation and infrastructure experience for residents and visitors, the rankings in this indicator have changed dramatically. None of the top five this year was in the top five last year. For instance, Singapore, which ranks first this year, ranked 17th last year. Seoul and Toronto, tied for second place this year, ranked ninth and 15th, respectively, last year. Tokyo has also moved up, albeit only two places, to number four, while number-five Hong Kong has also moved up two places. In the end, Toronto is the only non-Asian city in the top five—as opposed to last year, when the top five cities were exclusively European or American.

Regarding US cities, in fact, only New York is in the top 10 this year, along with four European cities. Chicago has fallen 12 slots from second last year to 14th this year, tied with San Francisco, which has fallen 10 slots from fourth last year. And Los Angeles does even worse this year than in 2011, falling from 21st to 25th.

This indicator now reflects a rethinking, not simply of the category, but of the actual role transport and infrastructure play in a city’s development and cohesion. It now seeks to measure and assess the actual networks of *internal* mobility and physical connection that bind a city together and maximize both its economic efficiency and social integration. As a result, three variables (aircraft movements, incoming/outgoing passenger flows, and airport to CBD access) have been moved to the city gateway indicator, as they measure movements in and out of, not within, a city. Of course, traffic congestion is certainly an issue of internal urban mobility (or, more often than not, immobility); but it, too, has been transferred to demographics and livability primarily because the entire web of issues related to congestion—and, more generally, the use of automobiles in a city—has become less a matter of urban transport than of quality of life.

While several variables have been removed from this indicator, some have been added or altered. The altogether new one is public transport systems. This variable assesses the various systemic elements of a fully modern and efficient public transport network, which are manifestly more than the sum of metro tracks or tram rails. By gauging systemic coverage and connectivity (bus rapid transit, trolleys, or bike share, for example, as well as conventional modes), this variable measures the broadest possible coverage—or the extent to which the largest possible percentage of a city’s population has access to the widest possible means of public conveyance.

In addition, major construction activity now replaces skyscraper construction activity. While vertical density is a distinguishing (and often necessary) feature of urban life, skyscrapers are only one aspect of symbolic urbanism (the café and the cabaret are others). And while it is mostly European cities that are identified with a less vertical definition of urbanism, the “Old World” actually contains more than one continent. In fact, in many Asian cities that are now emblems of skyscraping ambition, it is often the resident of a Beijing *hutong* (an alley of traditional courtyard residences) or a Shanghai *lilong* (again, a lane of traditional low-rise settlement) who is the descendant of generations of urbanites. By contrast, many of the dwellers of much taller, “modern” structures are recent migrants from the countryside. It is precisely to stress this human dimension of infrastructure that we also moved the housing variable—which correlates very strongly with high quality of life—from demographics and livability to this indicator.

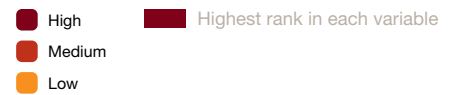


Mass transit coverage ¹	Cost of public transport ²	Licensed taxis	Major construction activity	Housing	Score
12	17	20	18	27	114
22	22	21	13	11	109
18	6	6	27	25	109
9	14	18	21	23	107
17	24	11	14	15	103
26	3	22	4	23	103
23	11	7	22	23	101
15	2	13	19	23	99
20	13	19	7	23	99
27	7	23	2	15	99
24	5	9	7	25	95
14	23	26	9	8	93
10	27	25	24	4	93
13	11	10	15	23	92
25	16	8	8	23	92
2	26	24	21	11	89
21	13	14	11	15	86
11	4	27	23	8	80
6	18	15	16	11	80
19	20	3	17	2	73
8	25	17	7	8	71
16	9	16	26	1	70
3	21	5	25	4	67
7	1	4	10	27	66
4	19	2	2	23	59
5	15	12	13	5	54
2	8	1	4	15	32

Each city's score (here 114 to 32) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

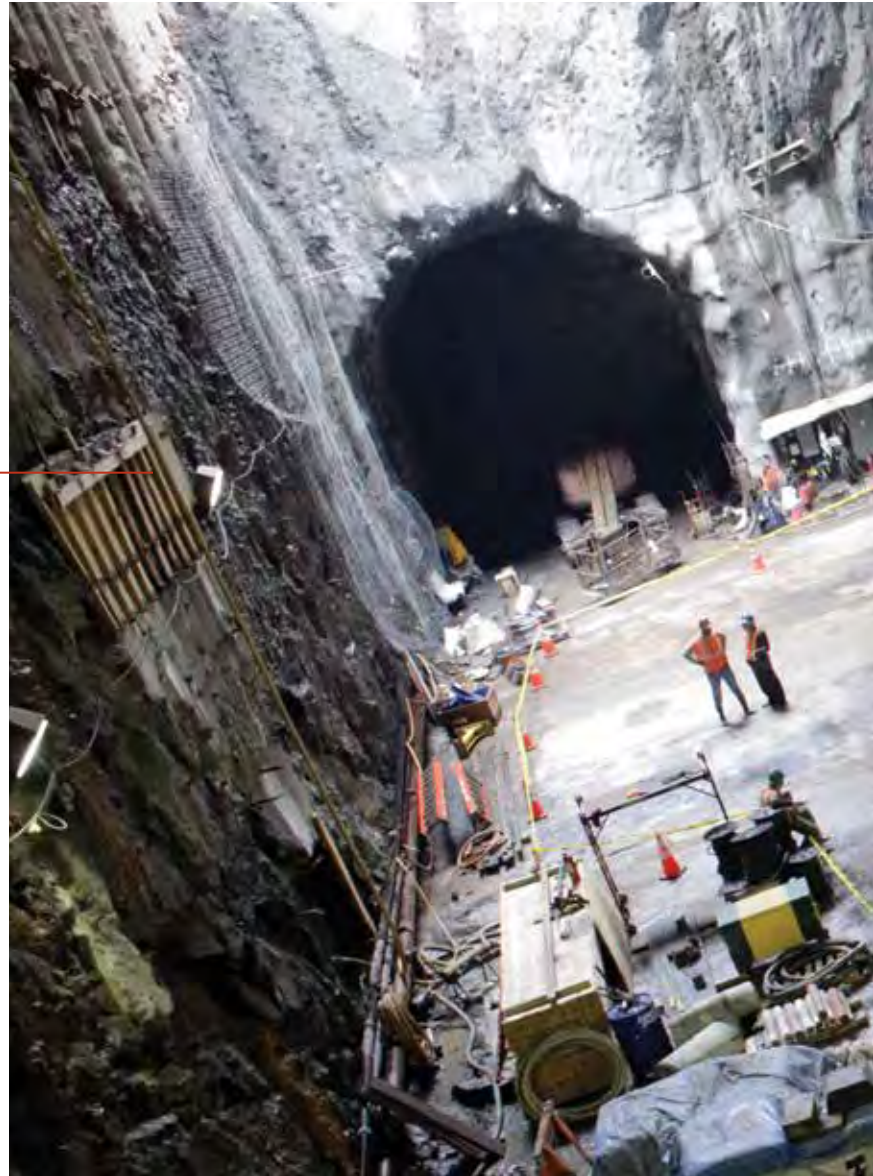
1 The kilometers of mass transit track for every 100 square kilometers of developed and developable land area.

2 Cost of the longest mass transit rail trip within a city's boundaries. Bus trips are used in the cities where there are no rail systems.



The ins and outs, overs and unders, of a great city

... keep economies and commuters on the right track, according to Peter Chamley of Arup engineers



Peter Chamley, head of infrastructure at Arup, the global design and engineering firm, joined Richard Abadie, his counterpart in PwC's infrastructure practice, for a conversation on the challenges of transportation and infrastructure in the world's great cities. The two discuss commuter and high-speed rail, air access, developed versus developing city needs, as well as the seemingly universal struggle to go from planning to completion on time, on budget, and at top quality.

The British government has recently announced plans for a new high-speed rail line linking London with major cities to the north. What would HS2¹ do for London?

We should not be thinking about HS2 as a London project because it's about the rest of the country. But for London, it will have a massive impact in that the commuting reach increases, the business reach increases, and the ability of the rest of the country to get to London and then on to Europe is significantly improved. HS2 is primarily about capacity rather than speed, and adding to the capacity of HS2 is absolutely essential for the economy.

Is the challenging process in the UK of dealing with planning and costs unique, or is it a common issue?

It's a fairly common problem, and it depends on the legislative framework that you're working in. Here, we have a well-developed legislative framework and a very rigorous planning process. Places like the States get embroiled in politics. Here, there's a fairly large degree of politics, but the planning process grinds on. You end up with a very good result, but it just takes time to get there. In Singapore, which is much smaller, you've got one level of government, decisions are made, stuff happens quickly.



Digging into Manhattan's bedrock for the new Second Avenue Subway, on which Peter Chamley served as chief engineer.

Using Old Oak Common² as an example, how can the cost of delays be reduced?

At Old Oak Common, you've got a large area of land and you need an integrated view of the whole. How does the land that is available integrate with Crossrail? Integrate with the Great Western route? Integrate with links to Heathrow? Integrate with High Speed 2? If you want to put an HS2 station in the way, you are going to cause a lot of trouble. But it needs somebody to take a step back and decide what, overall, is the right thing to do.

What are lessons from other cities in terms of centralized planning?

My experience includes many years in New York working on the Second Avenue Subway. There's this slow decision-making process and politics gets involved. If simple decisions had been made early and at the right level, you could have saved a huge amount of time and money.

What lessons can we learn from the Big Dig³ in Boston, a great case study on cost overruns.

The big lesson learned in the UK was from CTRL/HS1,⁴ which was delivered on time and on budget. I think it is about being realistic at the outset and not letting

wishful-thinking numbers be used in the planning process. There are quite a number of people who knew what the cost of the Big Dig was going to be right from the early days, but nobody allowed those numbers to be spoken because the project would never have gone ahead. On CTRL, there were realistic timeframes and realistic estimates, so there wasn't a constant battle of costs seen to be rising.

How can we reduce delays in flying into London? Is it a new airport, a new runway at Gatwick, a new runway at Heathrow?

There are several answers. The plan for the Thames Estuary airport is great, but that will take

long to come to fruition and we've got a problem right now. You won't get a new airport out in the Estuary completed for 15 years. In the meantime, we've got to improve Heathrow.

What impact do airport delays have on London?

I think people find it difficult but it doesn't deter them from coming to London. Heathrow Express

1 HS2 is a £33 billion (\$52 billion) high-speed rail line approved for construction to connect London to Birmingham, Manchester, and Leeds to the north.

2 Old Oak Common is a section of London with key rail connections.

3 A major highway tunnel project in Boston plagued by cost overruns and delays.

4 HS1 is the high-speed rail line from London to the Channel Tunnel. It is also known as CTRL, for Channel Tunnel Rail Link.

has made a fantastic change to the traveling experience to and from Heathrow. I live in central London, and I can be from my flat, checked in from door to door, through security, in less than an hour. What I see as the issue with Heathrow is the reduced number of connections. Going to certain countries is much easier via Frankfurt or Schiphol rather than by Heathrow, and Heathrow is possibly losing its position. Mind you, the flying experience into JFK is similar, but the experience of getting from JFK into Manhattan is just a nightmare.

Have the Olympics⁵ been good for London in terms of construction and tourism?

The construction industry can look at the Olympics with pride. Wonderful facilities have been delivered very quickly and on budget, and that puts the nail in the coffin of the story that British construction is always late and costs too much. It has been a great success in regenerating that part of London.

How can commuting into London be improved?

London has made some big strides. Everybody complains,

talking about at Old Oak Common, which would allow London to grow. London has to provide additional quality office space in the right locations, and Crossrail will be part of that. We have to make sure that inter-connectivity between HS1, HS2, and the Continent really works for the rest of the country. We have to sort out the capacity problem at the airports.

Compare infrastructure in developed cities versus developing cities.

It's a different set of challenges. In a place like London, the question is how to tweak infrastructure

York, you have straight wide avenues, with plenty of space to go underneath the avenue. You don't have that in London, but we've found a way to thread the needle. So we go up and over, over and under, in varying degrees and with varying amounts of clearances. The approach taken on Crossrail is to do everything off the street, so we don't have big excavations in the street where you would have a nightmare of dealing with the utilities.

Contrast that with the Second Avenue Subway project in New York, where there isn't space to put stuff off line because it's all multi-story high-rise buildings, and you are confined to the avenue's alignment. A large section of the Second Avenue Subway development has to be cut-and-covered [a temporary excavation from the street cover decking]. And it has been a nightmare just to deal with all of the utilities in the ground.

Is there a fundamental difference between the cost-benefit analysis for Crossrail and, say, the Delhi Metro?

There's always a problem estimating ridership with new transportation infrastructure going into a city that doesn't have it. In mature markets like London or New York, estimating ridership is well-proven, and we generally exceed the ridership that we anticipate. There is a long and sad history of new transportation infrastructure going into cities that have not had it before and the ridership projections are completely over-estimated.

Compare privately financed and publicly financed projects as they relate to quality, timetable, and cost overruns.

In the past, there has been plenty of experience of cost and schedule over-runs on public infrastructure projects. But this is a huge generalization and the picture is changing. With privately financed

Places like the States get embroiled in politics. In the UK, there's a fairly large degree of politics, but the planning process grinds on. You end up with a very good result, but it takes time. In Singapore, with one level of government, decisions are made, stuff happens quickly.

but commuting now is dramatically different than it was 20 years ago. There has been a fair amount of investment in new rolling stock and capacity, but probably not enough. That's where we've got to go—electrification, upgrading of existing lines, upgrading of signaling, improving stations to allow longer trains. It's in getting more out of the existing infrastructure.

What infrastructure should London invest in to be more competitive globally?

Crossrail⁶ will make a big difference and will allow Canary Wharf⁷ to grow. It is constrained at the moment by transport. Crossrail could be the catalyst for something like we were

to keep ahead of the game. In places like Mumbai and São Paulo, it's how to get some infrastructure in just to meet basic needs. Do we spend our dollars on sanitation, or on making sure we have a metro system that serves the city center and creates a vibrant economic hub?

London is so developed, there's hardly any space for anyone, let alone construction activity and TBMs [tunnel boring machines] navigating underground. Can you take us through that challenge?

The alignment of Crossrail, where it goes and how it gets there, is to a large degree driven by what is already in the ground, and a big challenge is avoiding building foundations. In places like New



St. Paul's Cathedral as viewed from London's Millennium Bridge, another Arup project.

projects, there has been a better track record of rigor being applied to making sure that we are on cost and on schedule and that the risk profile is managed correctly. These same levels of rigor are now being applied across the board.

During the Great Depression, America had the New Deal program and later the interstate highway system, spent a fortune on infrastructure and probably made a step change in its infrastructure. Some today would argue that we may have progressed in technology but not vision. What do you think?

We often forget the lessons of history. One of the most fantastic bits of private entrepreneurship was Penn Station⁸ in New York. Look at the challenges that the promoters of that project took on: Putting new tunnels using completely new technology underneath the Hudson and East Rivers; building this massive station in the middle of an already well-developed city;

dealing with the politics of New York at the time, Tammany Hall and all that. It's an object lesson in what people with vision and the drive to deliver can do. What we often lack now are projects having a champion who will get hold of them and make it their sole aim to deliver them. You might criticize Robert Moses, lots of people do, but he certainly delivered stuff. You might argue about whether it was the right stuff, but he certainly got it delivered. And those private backers and their railway companies in the UK and America that built these big iconic projects did it because they had a champion, a vision, and a drive to get things done. I don't often see that happening in public infrastructure projects that get mired in politics. You need a leader at the top of his game who is the Brunel⁹ saying, "I'm going to build the Great Western." Where are those people? If we've learned anything, it's that big projects need a champion to drive them.

Learn more

Video excerpts of this condensed conversation are available at www.pwc.com/cities, as is a full-length version of the entire, much longer discussion.

⁵ This interview was conducted in February 2012, before the Olympics in July-August.

⁶ Crossrail is a 118-kilometer (73-mile) rail line under construction linking London to the east and west. It involves 44 kilometers (24 miles) of tunneling under the city and is described as the largest civil engineering project in Europe, with a projected £16 billion (\$25 billion) cost. It is scheduled to begin service in 2018.

⁷ Canary Wharf is a major business and retail center built on former London docklands.

⁸ Pennsylvania Station is a key rail hub in New York City and the largest in North America. The original structure (demolished in 1963 and since replaced above ground) was considered an architectural showcase when it was completed in 1910, and a technological marvel because of the tunneling required under the Hudson and East Rivers.

⁹ Isambard Kingdom Brunel was a renowned British engineer and railroad pioneer who, starting in 1883, became the driving force behind construction of the Great Western Railway initially connecting Bristol and London.

Sustainability and the natural environment

Weighing the effectiveness of public policy

We have added “natural environment” to this indicator’s name in 2012 to reflect specific variables, usually of climate (Toronto’s winters) or geology (San Francisco’s seismic activity), over which municipalities have little control but which affect the daily lives of their citizens. The ongoing repercussions from last year’s Tōhoku earthquake and subsequent tsunami illustrate that, while nature may not be amenable to human control, its most tragic consequences can be mitigated by public policy.

Two variables remain from last year: recycled waste and air pollution. The last variable, public park space, was originally green space

as a percent of city area in last year’s lifestyle assets indicator. It has been renamed to reflect the true scope of the measure: access to public parks.

The decidedly different profile at the top of this year’s rankings, therefore, corresponds to the many changes in the variables. Almost every city in the top 10, with the exception of Moscow, is a mature economy, in contrast to last year, when four cities from the emerging world made the top 10. This was primarily because of renewable energy use, a variable that has been removed from this year’s evaluation because the available data are national, not municipal, and are accordingly non-comparable and may be misrepresentative.

	Natural disaster risk	Thermal comfort ¹	Recycled waste	Air pollution	Public park space	Score
27 Sydney	12	25	17	27	22	103
26 San Francisco	7	20	26	25	23	101
26 Toronto	25	7	23	26	20	101
24 Berlin	25	9	19	20	18	91
23 Milan	18	17	24	11	19	89
22 Stockholm	26	5	12	18	27	88
21 Moscow	27	1	18	15	25	86
21 Paris	21	17	8	14	26	86
19 New York	12	10	13	24	24	83
18 Madrid	22	18	5	20	17	82
17 Los Angeles	2	26	15	21	15	79
16 Buenos Aires	12	21	11	14	16	74
15 Chicago	21	7	7	23	14	72
14 Singapore	17	13	16	16	7	69
13 Beijing	19	3	20	2	21	65
13 London	17	11	14	17	6	65
11 São Paulo	17	27	2	14	4	64
10 Hong Kong	3	17	25	9	5	59
9 Mumbai	12	22	21	1	2	58
9 Seoul	5	8	27	6	12	58
9 Tokyo	1	14	10	22	11	58
6 Johannesburg	8	23	9	5	10	55
6 Kuala Lumpur	17	13	6	10	9	55
4 Mexico City	4	24	4	8	13	53
3 Istanbul	17	19	3	7	3	49
2 Shanghai	6	4	22	4	8	44
1 Abu Dhabi	25	3	1	3	1	33

Each city’s score (here 103 to 33) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

¹ Measure of the average deviation from optimal room temperature (72 degrees Fahrenheit) in a city. January and July heat indices were calculated for each city using an online tool that integrates average temperature and average morning relative humidity during each

month. A final thermal comfort score was derived by first taking the difference between a city’s heat index for each month and optimal room temperature and then averaging the absolute values of these differences.

■ High
■ Medium
■ Low
 Highest rank in each variable

In any case, the cities with highly developed environmental awareness—and the sustainability strategies that ensue as a result—are well-known globally. Six of them in the top 10 this year were also in the top 10 last year. Sydney, which topped the rankings this year, came in second last year. San Francisco and Toronto, tied for second this year, were seventh and fifth, respectively, last year, while Berlin fell to fourth from first place last year. Regardless of the rankings in any given year, these cities are all recognized globally for being at the forefront of urban policy on issues of environmental sustainability—and, more important, for transforming that policy into effective action.



Prussian blue skies boost sustainability in Berlin.

Measuring sustainability

The variables making up this indicator have changed continually during the last several years for the simple reason that “sustainability” is both difficult to define in *itself* and to implement as a coherent public policy—especially as cities vary widely in terms of climate, geology, demographics, and economic development. Making comparative analysis even more complicated is the fact that the criteria for data collection for this indicator vary from one city to the next. Three examples indicate the “degree of difficulty” in actually determining, and measuring, sustainability.

Greenhouse gas (GHG) data are now available for many cities, but the method of collection, degrees of verification, and types of emissions included diverge considerably. Paris’s data comprise sources of both food and waste, for example, while those of many cities do not (and American cities tend to exclude emissions from agriculture, fossil fuel extraction, and refinement and other industrial sources).¹ New York meanwhile measures GHG annually while other cities may do so every five or 10 years, or not at all.

Another case in point is a city’s recycling rate, which is not always an automatic indicator of commitment to sustainability. In many European countries, including Germany and Sweden, a greater emphasis on reducing

consumption and unnecessary packaging not only results in less waste, but in less recyclable materials as a percentage of waste. Moreover, although Sweden uses waste-to-energy technology to further manage waste—and reduce landfill—this advanced approach to waste management is not represented in our recycling variable. On the other hand, in developing cities such as Mumbai, community-driven and informal collection of recyclables, which also adds income in the poorest areas, makes the *actual* rate of recycling far surpass the official rate.

Finally, in the case of renewable energy, which was included in the indicator last year, there was little available and non-comparable data at the municipal level, so we had to construct a measure using country-level data. Subsequent research confirmed that the cities in our report were, in most cases, correctly represented by the resulting data. Nevertheless, after discussions with specialists in the field, it became clear that a few cities would have fared even better than their respective countries as a whole (which, of course, validates the general assessment that cities have become the world’s laboratories in sustainable living). In this instance, therefore, we decided to remove the variable.

¹ Inventory of New York City Greenhouse Gas Emissions, September 2011, http://www.nyc.gov/html/om/pdf/2011/pr331-11_report.pdf.



Toronto's former Mayor David Miller

... discusses the civility of his city, economic development, and the value of immigration.

By many measures, Toronto is a beacon of urban success, and from 2003 to 2010, David Miller was mayor. Here, Miller talks about what makes a city prosper and the interplay among the needs of business, the cultural vitality of a city, and the balance of infrastructure and the environment. He sees jobs, opportunity, and technology as keys to a city's prosperity. Miller now serves as the World Bank's special advisor on urban issues as well as Future of Global Cities Fellow at New York University's Polytechnic Institute.

Toronto comes across as a city of unsurpassed civility. Do you agree?

It's true. We are a city of newcomers; inclusion, social justice, and equity are core Canadian values. That creates a city where people value each other. It has implications for whom we elect, how we govern, how the city looks and feels.

Does that civility translate into economic benefits?

Yes. The fact that we are a civil city, that we have strong environmental values, has a positive impact on the economy. Modern companies, which can move to many cities, like to locate where it is profitable, where you've got a great labor force. Toronto has that. And the fact that we are relatively prosperous has helped fund those very good public services that, in turn, reinforce the civility of the city.



Cold comfort for a Torontonian in New York.

Cities are growing rapidly in population and economic power. But they seem to be shortchanged often by national or regional governments on funding, political influence, and the power to self-govern.

Yes, there is a trend worldwide of mass migrations to cities, and as a result, cities are acting on their own. Mayors are very practical. Mayor LaGuardia [of New York] quite famously said there is no Republican or Democrat way to pick up the garbage. Cities are becoming more powerful economically, but our national and

regional governments haven't caught up to that yet. They are just starting to wake up to the importance of cities.

Could you imagine redrawn jurisdictions—say, here's Toronto, including a whole region beyond just today's city limits?

Yes. A great city like New York is the heart of an urban region that arguably extends down the whole of the eastern seaboard almost as far as Washington. Toronto is the heart of an urban region that includes Hamilton, probably almost all the way to Niagara Falls and east a third of the way to Montreal.

How do you promote stronger public-private collaborations to do more with less?

Collaboration between the public and private sectors is essential to the health of cities. We convened a group of senior business leaders to write our strategy. We also had labor, non-profit, academic, and cultural organizations at the table. We asked the group, "How can we ensure prosperity in this city?" Their report, *Agenda for Prosperity*, ultimately was adopted by the City Council unanimously. And it's real recommendations—principles and then actions.

Great architecture, great urban design, just doesn't cost that much. The arts lift your spirit and your soul, and you need that even more when times are tough.

How can a city balance the needs of communities, developers, architects, and preservationists?

Development is crucial for cities, but growth at any cost doesn't work. First, you don't want sprawl because sprawl is environmentally and fiscally unsustainable. Second, you need a coherent plan. Our plan set out where the growth corridors were, and they corresponded with higher-order rapid transit. Third, the development must be very green.

What is the importance of infrastructure?

Infrastructure is hugely important, and now is the time to invest. But it's hard politically because you have some constituencies saying, "No, no, no, you can't—spending doesn't work. You've got to cut back." That's totally wrong economically, and it's wrong from a city building perspective because we need this infrastructure.

What are the most important areas for the long-term well-being of a city?

Intellectual capital and innovation matter a lot because businesses will come where there is the intellectual capital. Demographics

and lifestyle assets matter a lot. If you've got the intellectual capital and innovation, you've got a livable city, and if you've got economic clout, that's a very strong combination.

What does urban quality of life mean to you?

Can you walk around your city at any time of the day or night? Is it interesting and exciting? If you go to a new city, you walk it and learn it through your feet.

Can we afford aesthetics during hard economic times?

Great architecture, great urban design, just doesn't cost that much. The arts lift your spirit and your soul, and you need that even more when times are tough.

Are environmental targets and economic development mutually exclusive?

No. If you do the right thing for the environment, it's always the right thing for the economy.

How can cities exploit the advantage of density?

You need rapid transit so people can get out of cars. And you need great green spaces. You also need

to deal with the generation of electricity, and you need a smart grid so you can sell power back to the plant.

How does the city promote technology and innovation?

Toronto is a hotbed of IT. In one of our initiatives, pushed by the private sector, the city was a partner, and national and provincial governments very strong partners, in an organization called MARS, Medical and Related Sciences. It's a biotechnology incubator, right beside some of the greatest teaching hospitals in the world, right beside a fantastic research university, the University of Toronto. And it is right near our banking district. It has venture capital right in it, patent offices right in it, and

completely fitted-out labs so that small incubator companies can have the same state-of-the-art labs that a large multinational does.

How important are art and culture to a city?

The creativity that's inherent in the city not only relates to the arts. You need that creativity in industries like biotechnology, research, and IT. Cities that have great arts and cultural life have great research and innovation because they are creative cities.

Toronto is a huge magnet for immigrants. What are the benefits and the costs?

It's all benefits. We get the best and the brightest young people from around the world. We have

an incredible opportunity for innovation, for entrepreneurial activities, for learning from each other, for having a diverse labor force. And we've made it much easier for students to stay once they've studied, so we have this incredible pool of talent.

You said Canadians tend to favor immigration. Why?

Eighty percent of Canadians live in cities, and that's where the immigrants go, so people know newcomers. If you're not a newcomer, your neighbor is or your neighbor's parents are, and that's very important. Our immigration policies tend to recruit skilled people so Canadians see people come and work hard and succeed.

public pools that are for women only. So if you're from a Muslim country where it would be very uncomfortable for you to be seen by a man in your bathing suit, you have a place you can go. That's a simple example, but there are hundreds of examples like that. We have a history of great public services, and it matters to integration and it matters to business. Judged by the number of branches per person, or by the number of books circulated per person, we have the best public library in the world. If you go to the main reference library in Toronto and you get there when the doors open in the morning, people actually run in to use the computers. And those people are newcomers seeking their first job or seeking to upgrade their English skills or other skills, or wanting to get their credentials recognized in Canada.

You recently told a group of students that technology would play an increasing role in solving urban problems. How so?

People are moving to cities, and cities are going to help us meet the world's challenges of opportunity, of equality, and of the environment. Technology has a part to play in meeting those challenges. How are we going to meet air quality, water quality, and climate change goals? We are going to meet them through things like a smart grid, things like building light and heavy rail transport, and those rely on technology.

Toronto came in a close second in *Cities of Opportunity* rankings last year. Did that surprise you?

No. Toronto is a really livable city that's successful economically and that welcomes and integrates newcomers. One day, Toronto will be number one.

Learn more

Video excerpts of this condensed conversation are available at www.pwc.com/cities, as is a full-length version of the entire, much longer discussion.

[Toronto] gets the best and the brightest young people from around the world. We have an incredible opportunity for innovation, for entrepreneurial activities, for learning from each other, for having a diverse labor force. And we've made it much easier for students to stay once they've studied.

What are the challenges and benefits brought by less-skilled immigrants?

It has to do with the character of the people who come. It's an unbelievable thing to uproot your family and move halfway around the world. And the people who are brave enough to emigrate are the kind of people who are going to work incredibly hard. And that's true whether it's somebody who is working at a blue collar job or somebody who is a computer engineer.

Toronto is rich in ethnic communities. Does Toronto work to support that?

Yes, we are culturally sensitive. We have swimming hours in our

Demographics and livability

We know it when we see it, despite a certain *je ne sais quoi*

This indicator has been substantially revised this year into four variables, as opposed to seven in 2011, with the focus clearly on “livability,” a difficult term to define but one that most people instinctively feel they can interpret for themselves. In that sense, the data in this indicator as a whole seek to approximate, and reflect, what most people mean when they speak of livability.

In a fundamental way, this indicator is very much like sustainability. Just as there seems to be a global consensus on the cities that are most environmentally conscious, there is the same kind of relatively universal agreement on what makes a “livable” city—or, at least, on which cities are more livable than others.

It is no surprise, therefore, that seven cities in the top 10 this year were also in the top 10 last year, despite the considerable change in the respective variables. It is also hardly a shock that the top-ranked city in this indicator is Paris; even the most dyed-in-the-wool New Yorkers have a soft spot in their hearts for the City of Light, as the most recent films of Woody Allen and Martin Scorsese both confirm. (Many Parisians, it should be added, reciprocate this regard with their own fondness for New York.)

The cities in the top ranks of this year’s indicator are either all almost mythical in their appeal—not simply Paris, but Hong Kong,

Continues on page 77

	Cultural vibrancy ¹	Quality of living	Working age population	Traffic congestion ²	Score
27 Paris	25	24	16	17	82
26 Hong Kong	18	21	22	17	78
26 Sydney	21	26	6	25	78
24 San Francisco	20	16	23	17	76
23 Singapore	12	16	20	27	75
23 Toronto	16	27	15	17	75
21 Berlin	25	22	2	25	74
20 Stockholm	14	25	7	27	73
19 London	26	14	9	23	72
18 Chicago	18	20	12	17	67
17 Los Angeles	25	18	13	9	65
16 New York	27	13	8	11	59
16 Tokyo	22	23	3	11	59
14 Abu Dhabi	2	8	24	23	57
13 Madrid	8	19	5	23	55
12 Kuala Lumpur	5	7	18	23	53
11 Milan	16	17	1	17	51
10 Moscow	12	10	19	9	50
9 São Paulo	19	5	21	4	49
8 Beijing	3	9	27	9	48
8 Buenos Aires	10	11	4	23	48
6 Johannesburg	7	5	11	23	46
5 Mexico City	13	3	26	1	43
4 Shanghai	5	6	25	4	40
3 Seoul	6	12	10	9	37
2 Istanbul	9	2	14	9	34
1 Mumbai	1	1	17	4	23

Each city’s score (here 82 to 23) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

¹ Weighted combination of city rankings based on: the quality and variety of restaurants, theatrical and musical performances, and cinemas within each city; which cities recently have defined the “zeitgeist,” or the spirit of the times; and the number of museums with online presence within each city. The “zeitgeist” rankings take into account cultural, social, and economic considerations.

² The traffic congestion measure is taken from the 2011 Mercer Quality of Living Survey and adjusted using two additional sources. This measure reflects not only traffic congestion but also the modernity, reliability, and efficiency of public transport, which reflect a city’s active management of the issue.

■ High Highest rank in each variable
■ Medium
■ Low

Andrew Chan of Arup engineers sees emerging cities

... through the logical lens of resilience and sustainability



As deputy chairman of Arup Group, the global engineering company, Andrew Chan has played a key role in many of Asia's largest infrastructure projects. Overseeing Arup's East Asia region between 1996 and 2007, the Hong Kong-based engineer has helped build iconic skyscrapers, airports, highways, bridges, railways, subways, and even the Beijing National Stadium for the 2008 Olympics. An expert on sustainability, Chan was until recently chairman of the Hong Kong Green Building Council. He also sat on the corruption prevention committee of the city's Independent Commission against Corruption. Here, he explains how farsighted planning and "integrated infrastructure" can make cities more efficient and resilient.

As an engineer, what's distinctive about your approach to urban problems?

We engineers are used to mission-based tasks. We look at the risks a city faces, and say, "What's needed?" We set priorities, find the solution, implement the solution. In a developed city, we might talk about retrofitting buildings; in a city pursuing low-carbon strategies, we'd emphasize looking first at existing technologies. This is a logical sequence. It's common sense. Money is a problem, but very often it's not just about

money: It's about creating a governance system to make things happen.

Hong Kong's infrastructure is famously efficient. But are there areas of vulnerability?

We pride ourselves on everything being efficient here, but one major issue is that we don't talk in terms of "just in case." We rely heavily on everything working in the whole supply chain. But what if one element fails or becomes less efficient and then a whole chain reaction occurs? It's wise to consider these "just-in-case" scenarios. Unforeseen problems might be caused by climate change or issues over energy resources. For example, many Chinese cities upstream—from which we pump our water—will need more water themselves as they develop. China has a water problem and is looking to secure an alternate water supply system for its major urban centers. So I ask, "What alternative will Hong Kong have?" We have to become more resilient. We need a holistic approach, and what I call "integrated infrastructure." That can't just happen on its own. It must be by design.

Is this need for greater resilience different in other cities worldwide?

No. When you look at climate change as a driver, for example, you see that flooding risks, energy risks, and natural hazards apply to many places, including developing cities built beside riverbanks or coasts around Asia. They're very

susceptible to rising sea levels, extreme weather patterns, and natural disasters resulting from climate change.

Why is retrofitting old buildings so beneficial in saving energy and reducing carbon emissions?

Buildings use 90 percent of the electricity in Hong Kong and account for two-thirds of its greenhouse gas emissions. So retrofitting existing buildings is a very big opportunity. Hong Kong has an existing stock of 50,000 buildings, whereas new buildings are a very small percentage of the total. You can easily cut 30 percent of a building's energy use by retrofitting, so this is low-hanging fruit. That's why our firm is also pushing hard for retrofitting in cities like London and New York.

Cities across Asia are growing explosively. How do you balance the economic benefits with the threat posed to environmental sustainability?

The economies driving this urban growth can't afford to stop because then you have social problems if factories close or even slow down. When your GDP growth targets are so high, you do things that are environmentally unsatisfactory, so sustainability is under threat. But cities around Asia often have a certain life cycle: In Taiwan, cities would develop industry, pollute the environment—then they'd spend billions fixing it. Unfortunately, that's being repeated in China. When you look at the

I can't help but be impressed by Singapore. Things there are done as part of a grand plan. ... They set a high-level target, then planned the social and physical infrastructure accordingly for that population.



Work starts at a Singapore resort, with the city in background and a model of the Marina Bay Sands in foreground.

millions of cars being produced there, clogging up roads and producing pollution, you might say, “Surely, you should ban the cars.” But you can’t because the industry would collapse; then you’d have a labor problem and a social problem.

What do you think of the Western perception that China has an incredible ability to get infrastructure projects done, while cities like London, Paris, and New York move slowly?

It’s correct that China can get these vast, ambitious infrastructure projects done. The policy comes down from the central government: “We need this high-speed rail network.” And it happens. When the government wants a piece of infrastructure completed by whatever date, thou shalt do it. By hook or by crook, you get there. That’s the way things get done in China, and it’s very good because much of the infrastructure is being built in cities that are in a “need” stage rather than a “want” stage. They need more sustainability, so they have to cut down on aviation and embrace high-speed rail.

How does the West differ?

In the West, people typically look at the viability of a single piece of infrastructure in isolation. They analyze its financial

viability, calculate its internal rate of return, but don’t look at it within the context of the whole economy. In China, high-speed rail is one element in an overall grand plan. Projects are looked at in this broader context from a very high level. That’s something the West is missing.

Did last year’s disastrous high-speed rail crash in China raise questions about its ability to handle such technologically complex projects?

They have the best technology, so I don’t think it’s really a technology problem. It’s a management problem. It’s an operating problem. It’s a people problem.

Does China still struggle to innovate when it comes to infrastructure?

Yes and no. Innovative solutions aren’t appreciated in the same way as in the West: In China, there has to be a reason to innovate, whether it’s doing a project at a lower cost or very quickly. But some of the big, tricky projects being built in western China now are exceptionally innovative: They’re doing major civil works like constructing a big bridge across a deep valley, and difficulties in access and machinery are forcing them to innovate. China is still going through a learning process when it comes to very high-tech control

systems, and some would say they did steal or copy from the West. But I wouldn’t discount them on innovation. China is going through pretty much what Japan went through in the ’60s and ’70s: They’re learning and modifying.

The NGO Transparency International has said corruption is a bigger problem in infrastructure than any other industry. How challenging is this in developing countries?

In some developing countries, corruption is so rampant that it’s almost written down: “To do this, it’s this price; to do that, it’s that price. And if you don’t deliver on time, it’ll be refunded.” It’s part of the system. Arup tries to stay away from places where corruption is rampant, so our involvement in certain countries is very limited. But Hong Kong’s anti-corruption system is so good that almost all governments in Asia come here to learn about it. I’ve also been involved in conferences in China on preventing corruption: One presentation said their system is even better than ours, since they have huge books laying out even more stringent rules than in Hong Kong. But it’s not just about the system you set up. You also need to create total transparency and a level playing field in the marketplace. They don’t have that yet. Asia still needs to work very hard at that.

How does urban development compare in China and India?

I see a great parallel between Mumbai and Shanghai in their stages of development. But China has an advantage in that it builds infrastructure with state money, whereas it’s often done with the help of private investment in cities like Mumbai and New Delhi. When China decides it needs a ring road, it gets built in 10 months, no questions asked. It might be that India would be growing even faster than China if not for the corruption.

In this report, we look at 10 factors that make cities great. Which are the most important?

For the average person in a developing city, the most important factor is safety, health, and security. Efficiency is also important—and that relates to transport or connectivity and how you lay things out through good urban planning. This ability to get around efficiently is probably second in importance only to safety. In developed cities, you need economic activity that creates jobs: So things like ease of doing business and smart technology are very important. For some developed cities, efficiency is a big issue because of inadequate transport infrastructure. In London, the transport infrastructure is badly in need of upgrading and investment.

We pride ourselves on everything being efficient in Hong Kong. But what if one element fails or becomes less efficient and then a whole chain reaction occurs? Unforeseen problems might be caused by climate change or issues over energy resources. We have to become more resilient. That can’t just happen on its own. It must be by design.

I'd like to create a true eco city. You need infrastructure that works together in a holistic way, so that energy, water, transport, and waste are all integrated. We've planned these projects and provided thought leadership, but it's very difficult to make them happen.



Vanke Center, Shenzhen, China, 2010.

Can urban density enhance sustainability?

You can certainly achieve greater efficiency through density. In Hong Kong, we're so close to one another—in terms of time rather than distance—that we can get to whatever we need to do within half an hour or an hour. That facilitates many activities—economic and cultural—easily and cheaply. The energy used per capita for transport is exceptionally low here, but this density can only work if the transport system is convenient, reliable, and comfortable, as in Hong Kong. In that case, density helps, enhancing energy efficiency and improving connectivity among people. But density can also cause quality of life to suffer if a city feels overcrowded.

Of the 27 cities spotlighted here, which benefit most from good planning?

I can't help but be impressed by Singapore. Things there are done as part of a grand plan. When the population was 3.5 million, the government talked about a future with 5 million or 7 million people. They set a high-level target, then planned the social and physical infrastructure accordingly for that population. They also have a transportation network system where they say, "Every citizen will be within 400 meters of a metro entrance." That's very farsighted, and this rail-based approach is very sustainable. When it comes to water, they've also planned ahead. Hong Kong plans in a more piecemeal way, solving problems as they pop up rather than having a longer-term vision and being more methodical.

What urban project do you still dream of doing?

I'd like to create a true eco city. You need infrastructure that works together in a holistic way, so that energy, water, transport, and waste are all integrated. We've planned these projects and provided thought leadership, but it's very difficult to make them happen. People say: "The IRR [internal rate of return] is this, so why should I pay more for a district cooling system that requires longer to pay back our investment?" If one element hits that problem, the rest fall apart, and you don't make the integration happen. I'd be ambitious enough to aim for a new city with 50,000-60,000 people. At that scale, you can make the sums work. That's my dream project.

Learn more

For the full-length version of the entire, much longer discussion, go to www.pwc.com/cities.

Economic clout

Asia rises, but we'll always have Paris

The name of this indicator says it all, and concisely. What is critical in the term, however, is not the adjective but the noun. What is central to the rankings here is the actual clout a city's economy gives it, not merely the cumulative potency of the economy itself. In that sense, this category assesses what has always been the historical understanding of urban strength: a city's dominion beyond its borders.

What was once called a "hinterland" is now called a region or metropolitan area. The label refers to the wider geography of which a dominant city is the economic core. The integration of the global economy, however, now allows cities to return to prospects of transnational influence and power that predate the 20th century.

And while no one may think that any contemporary city can (or seek to) wield the imperial hegemony of Periclean Athens, 16th-century Amsterdam, or Victorian London, the current notion of economic clout transcends national boundaries, if only because cities perceive themselves as competing with other cities beyond their traditional frontiers, not only economically but in terms of global recognition and prestige. It is a sign of the times (and hardly coincidental) that New York's mayor, Michael Bloomberg, wrote in the *Financial Times* earlier this year that "cities cannot afford to cede their futures to national governments," while, just a couple of days later, Mayor Rahm Emanuel of Chicago, in announcing a multibillion-dollar infrastructure plan to build "a new Chicago," said that he refused to "tie" his city's future to the "dysfunction" of state or even national politics.

It is this ability to translate urban strength into a global economic presence that this indicator tries to measure. And, again, in order to do so as well as possible, we have engaged in a major revision for the 2012 edition, removing four variables and adding two others. By eliminating domestic market capitalization, inflation, and strength of currency (and moving level of shareholder protection to ease of doing business), while adding productivity and rate of real GDP growth, this indicator now has a trimmer, and decidedly more recognizable, profile. Now a city's appeal beyond its natural economic region pops out of the data in the

variables measuring Global 500 headquarters and, especially, foreign direct investment (FDI).

But despite the substantial reorganization of this indicator, certain trends observed last year are already coming to pass. In summing up our discussion in 2011, we concluded that, "Three factors are unusually suggestive of future developments." First of all, we noted that, although the top three cities were European or North American, Hong Kong had come in fourth and five Asian cities were in the top 10; clearly, we thought that Asia was the continent to watch. It is certainly turning out that way.

Beijing has rocketed to the very top of the rankings this year, from ninth in 2011. What is impressive about the Chinese capital's performance is that it ranks second in one variable and in the top five in four others. Even in the one area in which Beijing performs poorly—ranking second to last in productivity—it has nowhere to go but up, especially given that China has been focused on increasing productivity for many years.

Meanwhile, the other city that has leaped up the table is also Chinese. Shanghai moves up three places from last year, coming in just one point behind London and New York, which are tied for third. It also scores at the very top in two out of six variables—the only city to do so in this indicator. Asia's cities perform impressively this year. And while they only make up five out of the top 10, as in 2011, their presence as a whole this year is much more dynamic. Mumbai, for example, has moved up four places since last year to finish in the middle of the rankings.

Paris's continued strength is the only finding that is as impressive as Asia's dominance.

It was number two last year; it is number two this year. It was number two the year before last.

But this consistency is hardly an accident: As the capital of the country with the world's fifth largest economy (ahead of both Brazil and the UK), it naturally hosts a large number of Global 500 headquarters and just as naturally is the object of significant foreign investment. Moreover, an inordinately large segment of its (highly productive) population

	Number of Global 500 headquarters
27 Beijing	26
26 Paris	25
25 London	24
25 New York	24
23 Shanghai	17
22 Singapore	12
21 Hong Kong	16
20 Toronto	21
19 Moscow	20
18 Tokyo	27
17 Milan	15
17 Sydney	12
15 Stockholm	12
14 Mumbai	20
13 Seoul	22
12 Madrid	20
12 San Francisco	12
10 Abu Dhabi	3
10 Berlin	6
8 Buenos Aires	3
8 Chicago	12
8 São Paulo	15
5 Kuala Lumpur	6
4 Istanbul	6
3 Mexico City	15
2 Los Angeles	12
1 Johannesburg	3

works in financial and business services: 36.3 percent, as opposed to London's 35.7 percent, let alone New York's 26.9 percent.

The second factor we warned readers about in 2011 was the possibility that the eurozone crisis might negatively affect European cities, particularly Madrid, in the following year. That is exactly what happened, with Madrid falling in the rankings from fifth last year to 16th this year.

Financial and business services employment	Attracting FDI: Number of greenfield projects	Attracting FDI: Capital investment	Productivity ¹	Rate of real GDP growth ²	Score
24	23	25	2	25	125
26	22	20	21	6	120
25	26	24	16	4	119
19	20	17	26	13	119
14	27	27	9	24	118
11	25	26	15	21	110
7	24	22	12	18	99
20	10	9	18	20	98
10	21	23	5	16	95
8	19	19	17	2	92
27	14	10	19	5	90
15	16	16	22	9	90
22	7	5	20	17	83
4	18	13	1	26	82
16	11	11	10	11	81
6	17	18	14	1	76
23	1	1	25	14	76
1	13	21	27	3	68
17	8	14	13	10	68
18	5	7	7	27	67
21	2	2	23	7	67
5	15	12	8	12	67
12	12	8	4	22	64
2	9	15	6	23	61
3	6	6	11	19	60
9	3	3	24	8	59
13	4	4	3	15	42

Each city's score (here 125 to 42) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

■ High ■ Highest rank in each variable
■ Medium
■ Low

¹ Productivity is calculated by dividing the gross domestic product (GDP) in 2012 US dollars by employment in the city.

² GDP percentage growth rate from 2010-2011 in real terms expressed in 2012 USD.

Finally, we pointed out last year that, as Paris proves so well, a city's cultural influence becomes dominant only after it is reinforced by economic power, and cities such as Berlin, Istanbul, and Mumbai need economic strength to bolster their global cultural presence. By the looks of this year's rankings, Mumbai is beginning to meld its cultural vitality with economic clout.

Ease of doing business

Competitive cities know how to stay competitive

This indicator shares with intellectual capital and innovation the most number of variables, a total of nine. The reason for this substantial dataset is obvious: The combination of innovation and human capital with a hospitable and responsive business environment is the classic recipe for economic success. As opposed to the intellectual capital indicator, however, this one has been significantly enhanced and redesigned.

It now includes two new variables: resolving insolvency and level of shareholder protection (the latter moved from the economic clout

indicator). Another new variable, employee regulations, encapsulates the data that were previously contained in three variables that assessed ease of hiring and firing and rigidity of hours. Still, what is most telling about the results this year is that, despite the section's considerable reevaluation and reorganization, leading performers remain largely the same, and the changes at the very top of the rankings concern only two cities and involve minor adjustments.

Singapore ranks first this year, up from second in 2011. Hong Kong is now second,

	Ease of starting a business**	Resolving insolvency**	Employee regulations***	Ease of entry: Number of countries with visa waiver**
27 Singapore	25	26	26	27
26 Hong Kong	24	18	23	25
25 New York	23	22	27	8
24 London	19	24	2	23
23 Toronto	26	25	10	12
22 Stockholm	14	16	8	17
21 Los Angeles	20	22	26	8
20 Chicago	22	22	24	8
19 Tokyo	8	27	13	14
18 Kuala Lumpur	13	10	19	26
18 San Francisco	22	22	22	8
16 Sydney	27	17	16	9
15 Seoul	18	23	11	24
14 Paris	17	11	6	17
13 Madrid	5	15	17	21
12 Berlin	9	12	5	19
11 Mexico City	11	14	21	13
10 Milan	10	13	4	20
9 Johannesburg	15	6	12	22
8 Abu Dhabi	16	1	18	10
7 São Paulo	6	2	7	19
6 Beijing	3	8	15	3
5 Istanbul	12	4	4	15
4 Moscow	7	9	9	4
3 Buenos Aires	4	5	1	11
2 Mumbai	1	3	20	3
1 Shanghai	3	8	15	3

Each city's score (here 202 to 56) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

High
Medium
Low

Highest rank in each variable

*Country-level data.

**Data based on countries' most populous city except in the case of employee regulations and ease of starting a business, which have been differentiated for US cities.

although it was first last year. As for numbers three, four, and five, they are the same cities in the same order as in 2011: New York, London, and Toronto. If there is a lesson here, it is that those cities that have created globally competitive business cultures understand what it takes to maintain their advantage—and that, of course, city policies and regulations, and their effects, do not change overnight.

Nowhere is this more apparent than in the results scored by top-ranking Singapore. Its

tally across the board is truly impressive: It finishes first in three variables, second in one, and third in two others. There is one variable in which it scores in a middling rank (foreign embassies or consulates) and only one in which it truly finishes badly. Interestingly enough, this one variable, flexibility of visa travel, would intuitively seem to be the logical extension of ease of entry, in which Singapore tops the chart. (See “Key to the variables,” page 93, for the precise definition of flexibility of visa travel, as opposed to ease of entry.)

There are some additional points worth noting about the top 10 cities. First of all, while US cities once again continue to rank first in employee regulations, or the ease of hiring and firing and setting work hours, they also consistently do well in several other variables. In fact, the only areas in which American cities fall into the bottom half (or even third) of the rankings are ease of entry and flexibility of visa travel (as well as, with the exception of New York, number of embassies or consulates)—clearly a negative signal to send in a global economy.

Continues on page 77

Flexibility of visa travel ^{3*}	Foreign embassies or consulates	Level of shareholder protection ^{4**}	Operational risk climate*	Workforce management risk	Score
4	15	27	27	25	202
26	12	26	25	19	198
10	22	24	20	26	182
27	26	19	16	25	181
16	11	24	24	27	175
21	20	16	26	23	161
10	8	24	20	22	160
10	7	24	20	21	158
18	24	17	15	20	156
21	17	25	13	10	154
10	7	24	20	19	154
11	11	13	24	19	147
19	18	10	11	12	146
12	27	10	21	16	137
25	19	7	14	13	136
23	23	7	22	15	135
18	14	15	8	3	117
24	5	13	11	11	111
14	1	19	7	6	102
4	13	1	12	14	89
23	5	10	9	7	88
4	25	7	6	9	80
15	9	13	4	2	78
6	21	3	2	1	62
14	17	3	1	4	60
5	3	15	3	6	59
4	2	7	6	8	56

1 Sum of three rank scores from the World Bank's Doing Business study, including: ratio of minimum wage to average value added per worker; notice period for redundancy dismissal (for a worker with 20 years of tenure, in salary weeks); and paid annual leave for a worker with 20 years of tenure (in working days).

2 Count of visa exemptions includes tourist and business travel.

3 Count of countries allowed a stay of 90 days or more for tourist and business travel.

4 The level of shareholder protection index is the average of indices that measure "transparency of transactions," "liability for self-dealing," and "shareholders' ability to sue officers and directors for misconduct."

Cost

Comparative advantage is the bottom line for every city, developing or developed, as the 2012 order tilts eastward

The most difficult—and continually challenging—aspect of preparing *Cities of Opportunity* every year is ensuring that its analysis is not only based on reliable and credible data, but on a critical evaluation of those data. In today's world of international organizations of the highest integrity offering easy access to their databanks (from the IMF and World Bank to the OECD and World

Economic Forum), gathering information is, in fact, the easiest part of our job. The hard part is assessing that information. The question always remains: Does the analysis *make sense*.

Upon examining last year's results in this indicator in preparation for this year's report, we felt that they had inadvertently tilted toward the West. The issue wasn't that they

showed the five lowest-cost cities in our rankings coming from North America (followed by Berlin and Sydney), while seven out of the 10 highest-cost cities were in the developing world. What seems counterintuitive isn't necessarily so. Our cost indicator, after all, measures costs for a *businessperson* living in our cities—which is to say, the cost of a transnational, middle-class way of life.

The point was to capture the actual costs of a middle-class lifestyle in each of our cities as accurately—or, at least, as *effectively*—as possible. In the event, we've restructured this indicator again. We've kept only two variables from last year (total tax rate and cost of

	Total tax rate	Cost of business occupancy	Cost of rent	Consumer price index ¹	iPod index ²	Cost of Internet	Score
27 Berlin	14	26	24	18	18	24	124
26 Seoul	23	13	17	17	12	26	108
25 Kuala Lumpur	21	24	25	25	7	4	106
24 Istanbul	18	14	22	22	6	20	102
24 Mexico City	9	20	27	26	3	17	102
22 Johannesburg	22	27	19	21	9	2	100
21 Los Angeles	16	25	11	13	26	8	99
20 Madrid	19	21	15	16	16	9	96
19 Chicago	15	23	10	15	20	10	93
19 Mumbai	3	11	26	27	1	25	93
17 Abu Dhabi	27	22	8	19	13	1	90
16 Toronto	24	18	13	6	23	5	89
15 San Francisco	17	17	6	8	26	12	86
15 Stockholm	8	16	16	5	22	19	86
13 Shanghai	7	8	18	24	5	21	83
12 Buenos Aires	1	19	23	20	2	15	80
11 Beijing	6	4	20	23	4	22	79
10 Hong Kong	26	1	3	11	14	23	78
9 Moscow	12	5	9	14	10	27	77
8 London	20	3	5	3	22	18	71
8 Milan	3	15	14	10	15	14	71
8 Singapore	25	10	2	7	11	16	71
5 New York	14	12	1	9	27	7	70
4 Paris	5	7	12	4	17	13	58
3 São Paulo	4	6	21	12	8	6	57
2 Sydney	11	9	4	1	26	3	54
1 Tokyo	10	2	7	2	19	11	51

Each city's score (here 124 to 51) is the sum of its rankings across variables. The city order from 27 to 1 is based on these scores. See maps on pages 16–17 for an overall indicator comparison.

1. A relative measure of consumer goods prices, including groceries, restaurants, transportation, and utilities. The CPI doesn't include housing expenses such as rent or mortgage. The index is relative to New York City (score = 100). If a city has a CPI of 120, it means it is estimated to be 20% more expensive than New York (excluding rent).

2. Working hours required to buy an 8 GB iPod nano. The index divides the price of the product by the weighted net hourly wage in 14 professions.

■ High
■ Medium
■ Low

■ Highest rank in each variable

business occupancy), while adding four new ones—cost of rent, consumer price index, iPod index, and cost of Internet—which also increases the variables from five to six, thus improving the total dataset.

With the exception of the iPod index, the other three variables all measure actual *living* costs (while only one variable did last year). Some costs—that of rent, most obviously—have become critical issues for business in recruiting talent, from New York and Singapore to Moscow and Chicago. The iPod index itself is not only a sure gauge (and therefore efficient surrogate) of purchasing power, but it also allows for straightforward comparisons of that purchasing power between cities (Sydney and Buenos Aires, for example).

Interestingly, the ensuing rankings now reflect the 2010 results, before last year's changes, when five developing cities and five developed ones were in the top 10, and Johannesburg ranked first. This year, Berlin ranks first, but the next five cities—Seoul, Kuala Lumpur, Istanbul, Mexico City, and Johannesburg—are all from the developing world. Los Angeles, Madrid, Chicago, and Mumbai complete the top 10, giving developing cities six out of the 10 spots—as opposed to last year, when they only had two.

The bottom 10 in this indicator now include the mature global centers that common sense tells us instinctively, and experience confirms empirically, are costly cities in which to live and work. But the presence of Berlin at the top—

and cities such as Los Angeles, Madrid, and Chicago also ranking very well—in this indicator continues to prove that mature economies are not preordained to suffer, let alone decline, even in head-on competition on costs alone. Every city can compete in cost containment as long as it maximizes its own competitive advantages. In the end, as with most of our indicators, each city's final ranking is, to some degree at least, up to the city itself.

Continued stories

Health, safety and security Continued from page 51

to form the first human communities, the earliest cities. It stands to reason, then, that the most developed cities are those that continually top the rankings in this indicator.

Stockholm and Toronto repeat their respective performances at first and second place this year. After coming in fourth in 2011, Sydney finished third this year. Chicago, which was third last year, dropped to fourth in this newest edition of *Cities*. San Francisco also dropped one place, ranking fifth this year after tying with Sydney for fourth last year. These are all marginal movements. In any case, there is not one developing city in the top 10 this year—just as there wasn't last year.

But there is a reason Rome wasn't built in a day. The only thing that takes longer to create than urban infrastructure is the intangible sense of well-being and trust that is the most direct result of the very tangible systems of social protection and communal order put in place by developed societies.

Demographics and livability, Continued from page 67

San Francisco, and Singapore, as well as Berlin and London—or have been the beneficiaries of a global “buzz” for several years, as in the case of Sydney, Toronto, and Stockholm.

Still, a concept such as livability is infinitely malleable, unusually provisional, and ultimately subjective, with each person judging it individually. Moreover, great cities such as New York or Tokyo become great over a very long period and because of immense effort, mostly for the sake of their own citizens. Their standing in a ranking such as this, consequently, is simply a snapshot of a moment in time. What is indisputable is that they, as well as most of the other cities that fall in the middle or even at the bottom of the rankings here, can easily climb much higher—and probably will, sooner rather than later.

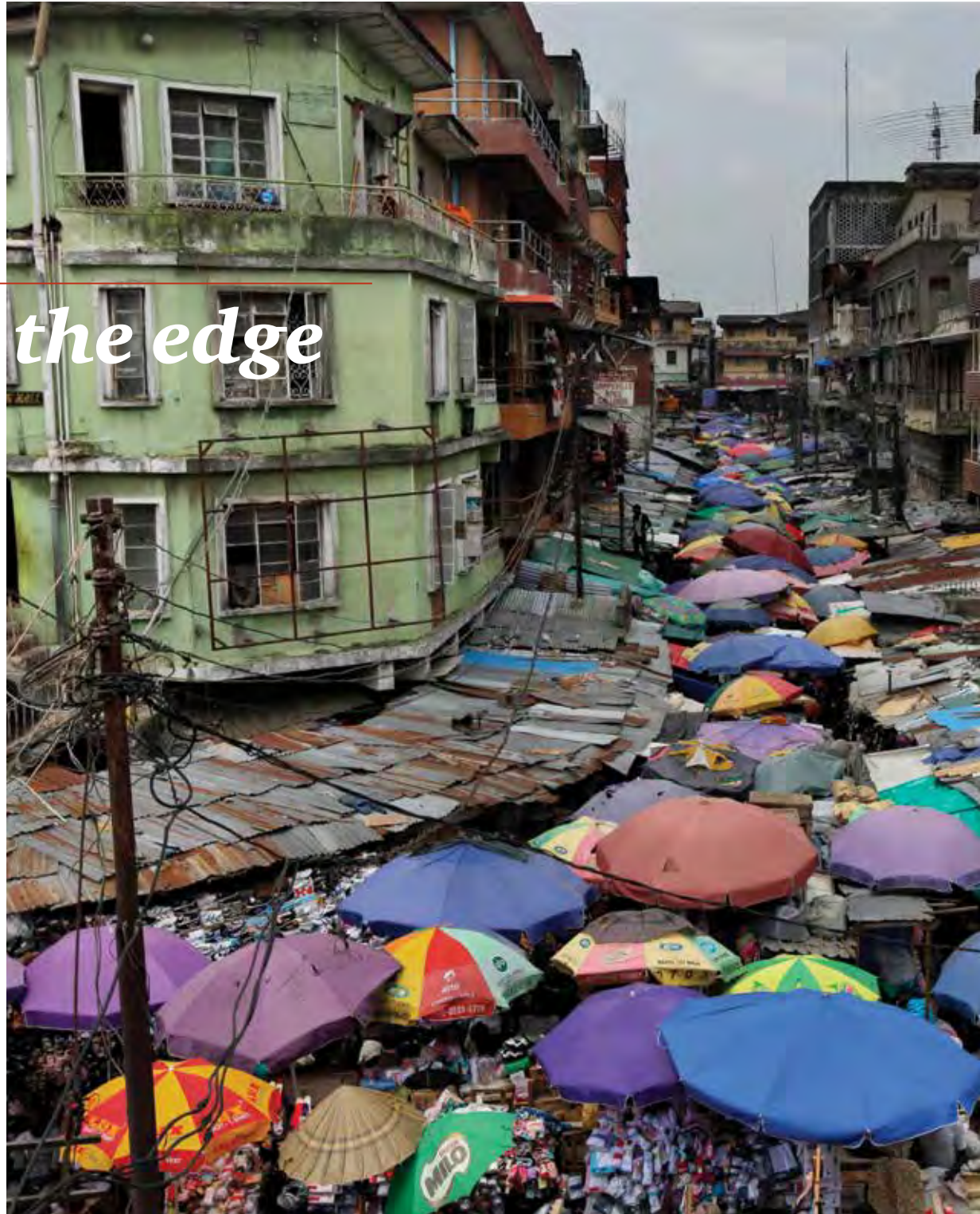
A passing glance at some of the cities at the end of the list—Moscow, São Paulo, Beijing, Buenos Aires, Mexico City, Istanbul—make that a relatively safe prediction. So, while Shanghai scores near the bottom of the rankings, it is easy to envision a time, in the very near future, when that placement will seem inconceivable.

Ease of doing business Continued from page 75

The other notable results in this year's rankings come from Stockholm and Tokyo. The Swedish city has climbed the chart three slots to eighth this year, from 11th last year, while Japan's capital has also moved up, from 12th last year to number 10 this year.

On the negative side, there is one surprise regarding Sydney. There is also one result involving Europe that is, unfortunately, anything but surprising. The unexpected outcome was Sydney's fall out of the top 10 cities to 12th this year, from sixth last year. The predictable development was the continuing difficulty of European cities to compete in this indicator. Stockholm is the only continental European city in the top rankings this year—and there were none last year. Paris, Madrid, Berlin, and Milan finish 14th, 15th, 16th, and 18th, respectively (while Istanbul and Moscow find themselves in the bottom five of the list). The data thus echo what so many policymakers in Europe itself have been saying for the last couple of years: that a significant factor in resolving the eurozone crisis is indeed making it easier to do business in Europe.

Cities at the edge





A street market in Lagos, Nigeria

Megacities, megachallenges

Emerging cities will need to grow, and invest, even more to enhance their citizens' quality of life

The metropolitan areas of the world's cities currently contain 3.6 billion people,¹ more than half of the planet's population.² In the coming years, cities will constitute an ever-increasing percentage of human communities, rising both in number and size. Just to give one example, the number of cities with more than 750,000 residents has grown *thirteenfold* in China since 1950, multiplying from 10 to 132, with a combined population of 290 million—or the equivalent of 360 San Franciscos.³

China is currently adding 40,000 people daily to its urban population. It is not alone. India is adding 20,000, while Indonesia, Nigeria, and Pakistan are projected to add over 350 million urban residents during the next four decades. Since the end of the Second World War, urbanization has been the overriding demographic trend in every continent but especially in the developing world. In 1950, both Africa and Asia were almost completely rural, with only 14 percent of Africa's people and 16 percent of Asia's residing in cities. By 2010, the number of people living in African cities had almost tripled, making up 40 percent of the continental population, while urban dwellers had increased over two and half times in Asia, to 42 percent of the total. In another 13 years, Africa will be 47 percent urban and Asia will have reached the 50 percent threshold of an urban majority. Meanwhile, Latin America and the Caribbean are already 80 percent urban.

This tremendous—and tremendously rapid—urbanization has led inexorably to another fact: Today, Asia alone encompasses 50 percent of the world's urbanites. While this reality does not, of course, redefine the nature or functions of a city, it certainly refocuses the world's attention on urban centers that were mostly invisible just two generations ago. A look at the world's largest cities since mid-20th

century presents a vivid illustration of how much the urban world has changed. (See chart next page.) Of the top 10 metropolitan regions in 1950, three are European, two are North American, and one is Latin American—for a total of six in the West—while two are Japanese, one is Chinese, and one is Indian. Move, however, to the year 2010, and the general landscape is utterly transformed.

Europe has disappeared. And of the three Western cities, only one—New York—is in North America, with São Paulo and Mexico City making up the other two (and replacing the ostensibly more “European” Buenos Aires). There are now not only a total of seven Asian cities on the list, but five are from the Indian subcontinent. Most telling of all, six of the 10 cities here were not on the list of the top 10 cities by population in 1950.

Of course, it is naïve to believe that, as with nations, the number of people in a city—or more accurately, the weight of its demographic presence—does not affect others' perceptions of it, and of its standing in the world. This is not to argue simplistically that quantity equals quality. *Cities of Opportunity* has proven year after year that small cities—San Francisco, Stockholm, Toronto—can cast enormous shadows on the world stage. And, of course, the obverse is equally true: that many extremely populous cities, mostly in the developing world, are now being severely tested

¹ This section measures metropolitan areas as opposed to the smaller city jurisdictional or administrative boundaries that are used for the 27 cities in the main report. Except as indicated, all data in the *Cities at the edge* section are from research undertaken by PwC and Oxford Economics for *Cities of Opportunity 2012*.

² According to the US Census Bureau, the world's population was approximately 7 billion as of June 1, 2012; see the monthly figures at <http://www.census.gov/population/popclockworld.html>.

³ According to the US Census Bureau, the city's population last year was 805,235; see “U.S. Census Bureau Delivers California's 2010 Census Population Totals, Including First Look at Race and Hispanic Origin Data for Legislative Redistricting,” March 8, 2011, at <http://2010.census.gov/news/releases/operations/cb11-cn68.html>.

by the massive repercussions of their largely unplanned expansion and have become, not models for others, but examples to be avoided.

Still, a large population can be a major step to development if it is seen not as a burden but as an enormous resource that can provide continual generational streams of human and intellectual capital. It's not coincidental that three cities with the largest populations in 2010—São Paulo, Mexico City, and Mumbai—are part of *Cities of Opportunity*. What is even more striking, however, is that eight of the 10 most populous cities in 1950 are in *Cities of Opportunity* today, although most of them are now comparatively much smaller.

Clearly, these cities have remained preeminent global centers because they built upon their strengths when they had the opportunity to do so. The most enduring power of developed cities is precisely the generations of planning, investment, and building that have gone into them—which, of course, are very difficult to emulate, let alone match. Indeed, the world's historically established cities suffer from a naming problem. The very phrase “historically established”—or “mature” or “developed” or even “advanced” city—implies comfort or repose, if not complacency or even decline. But the truth is that what makes New York, Paris, and Tokyo continue to thrive through the decades is that they are *consolidated* cit-

ies. That is, having gathered in their migrant populations (both domestic and foreign) and built their infrastructure—not just sewers and mass transit, but hospitals and schools and universities—as they rose in the world, they consolidated this immense, and very complex, sociopolitical and economic structure to create the singularly vital and universally admired communities they are today. (Because they were major urban centers in previous ages, cities such as Istanbul or Mexico City are also much more consolidated as urban communities than other cities in the developing world.)

Again, we should pause for a moment on the five largest cities by population in 1950: New York, Tokyo, London, Paris, and Moscow. With the exception of New York, the other four were all part of theaters of operations, to a lesser or greater degree, of the Second World War. London, of course, was the target of the Blitz and of the V-1 and V-2 attacks; the Battle of Moscow saw one of the bloodiest encounters of the war, with hundreds of thousands of casualties; and Tokyo was completely leveled by the bombing raids at the conflict's end. Only Paris was spared extensive physical damage because of the famous refusal of the occupation authorities to follow Hitler's orders to torch the city (the subject of the book and film *Is Paris Burning?*)—in itself a profound reflection of the enormous esteem in which certain cities are held by most of us.

Cities, in other words, that are fully developed, not only in terms of physical infrastructure but, even more important, because they've created a rich and resilient social network of citizens and institutions, have built in to themselves a natural capacity to survive and regenerate. As the cities of Europe and Asia proved after the Second World War, infrastructure can be rebuilt with the necessary funding and will. But it's the social glue that matters above all—the feeling of common purpose among the many human beings who call the same place home: what former New York and Los Angeles police chief Bill Bratton calls the “socialization” that is a city's key function and virtue (see interview, page 52).

Reaching that level of “socialization” requires extraordinary investment, however, both economic and intellectual. Leaving aside the intellectual investments, which naturally result from prior expenditure on education and culture, the capital investment is substantial, as a look at the overview of city investment spending on the next page shows.

Two figures stand out under the last column, “Average annual investment”: Beijing and Shanghai will have to devote 42 percent of annual GDP until 2025 to accommodate the cities' necessary growth, a sum just under two and a half times the 17 percent of annual GDP London will need to meet its infrastructure

Top 10 metropolitan areas by population size

1950, 1980, 2010

1950	Population (millions)	1980	Population (millions)	2010	Population (millions)
New York	12.34	Tokyo	28.55	Tokyo	36.67
Tokyo	11.27	New York	15.60	Delhi	22.16
London	8.36	Mexico City	13.01	São Paulo	20.26
Paris	6.52	São Paulo	12.09	Mumbai	20.04
Moscow	5.36	Osaka	9.99	Mexico City	19.46
Buenos Aires	5.10	Los Angeles	9.51	New York	19.43
Chicago	5.00	Buenos Aires	9.42	Shanghai	16.58
Kolkata	4.51	Kolkata	9.03	Kolkata	15.55
Shanghai	4.30	Paris	8.67	Dhaka	14.65
Osaka	4.15	Mumbai	8.66	Karachi	13.12

The population figures in this table are based on the larger geography of a city's urban agglomeration and not the municipal population data used in the main *Cities of Opportunity* comparison. Source: *World Urbanization Prospects*, United Nations

Capital investment is substantial to accommodate some emerging cities' growth. Beijing and Shanghai, for instance, will have to devote 42 percent of annual GDP, just under two and a half times the 17 percent London will need to meet its infrastructure requirements.

Forecast of investment spending relative to growth

2012-2025

	Population 2012 / 2025 (000s)	Employment 2012 / 2025 (000s)	Investment required 2012-2025 (\$ millions)	Average annual investment (% of GDP 2012-2025)
Abu Dhabi	790 / 960	380 / 520	366,690	27%
Beijing	16,810 / 26,060	9,910 / 13,120	2,111,380	42%
Berlin	3,470 / 3,580	1,730 / 1,790	348,600	20%
Buenos Aires	3,000 / 3,150	2,000 / 2,410	205,960	26%
Chicago	2,650 / 2,420	1,190 / 1,270	311,750	20%
Hong Kong	7,200 / 7,970	3,650 / 3,640	478,820	20%
Istanbul	13,220 / 14,280	4,260 / 5,260	814,200	26%
Johannesburg	4,400 / 5,160	1,560 / 2,000	205,540	20%
Kuala Lumpur	1,700 / 1,850	780 / 1,050	76,320	25%
London	7,970 / 9,020	4,710 / 5,450	1,244,400	17%
Los Angeles	3,820 / 3,970	1,500 / 1,770	438,780	20%
Madrid	3,300 / 3,480	1,350 / 1,570	375,390	20%
Mexico City	8,900 / 9,080	4,110 / 4,470	983,740	25%
Milan	1,330 / 1,420	750 / 840	284,290	20%
Moscow	10,710 / 10,920	6,180 / 5,830	581,860	26%
Mumbai	12,530 / 13,210	6,490 / 9,510	459,250	35%
New York	8,410 / 8,810	3,820 / 4,480	2,583,560	20%
Paris	2,270 / 2,390	1,800 / 1,810	722,790	20%
San Francisco	810 / 880	530 / 590	184,620	20%
São Paulo	11,350 / 12,750	5,570 / 7,130	919,380	22%
Seoul	9,900 / 9,670	5,050 / 5,060	653,570	24%
Shanghai	14,330 / 15,760	7,350 / 8,140	1,830,600	42%
Singapore	5,230 / 5,660	3,150 / 3,560	760,410	26%
Stockholm	870 / 980	590 / 650	146,780	19%
Sydney	4,480 / 4,860	2,350 / 2,340	944,800	32%
Tokyo	13,020 / 12,960	6,220 / 6,250	1,064,650	20%
Toronto	2,830 / 3,260	1,450 / 1,590	703,030	25%

■ 2012 ■ 2025

The figures in the third column ("Investment required") are based on national macroeconomic data (GDP, investment, consumer, and government expenditure, etc.), not municipal data as used in the main *Cities of Opportunity* comparison.

Source: Oxford Economics, *Cities of Opportunity*

It is only when cities reach their maximum efficiency that their economic and social payback to their societies—in economies of scale for service provision and infrastructure costs, reduced energy use, and labor agglomeration—are at their peak.



Xiaojiahe in Beijing's university district.

requirements. Of course, not all developing cities require equal investment. Only Beijing, Shanghai, and Mumbai need to spend sums considerably higher than the 20-26 percent of GDP needed by most developed cities. Istanbul, Johannesburg, Mexico City, and São Paulo, on the other hand, all fall within that range—and Abu Dhabi just goes over it. But this is probably for several reasons. There are very few cities in the world with the financial resources of Abu Dhabi, which has already been able to bring its infrastructure up to developed-city levels; Istanbul and Mexico City have been major urban (not to say imperial) centers for hundreds of years, with basic infrastructure built long ago; Johannesburg is the largest city of the country with the largest GDP, by far, of any other African nation (including the oil producers);⁴ and São Paulo is the economic center of one of the most dynamic economies of the last decade.

Most emerging cities, and those cities of the developing world that will grow the fastest during the next decade, do not have these advantages, however.

The five African cities forecast by the United Nations to have the largest increases in population—Kinshasa, Lagos, Luanda, Dar es Salaam, and Khartoum—do not have Johannesburg's preexisting infrastructure, although robust growth throughout Africa over the next few years might provide the

economic resources needed for investment.⁵ In Asia, all five of the fastest-growing cities in population are on the subcontinent. It is reasonable to assume, therefore, that Delhi, Dhaka, Karachi, and Kolkata will probably need annual investment closer to Mumbai's 35 percent of GDP than to that, say, of São Paulo or Abu Dhabi. In any case, given that at least two-thirds of the world's megacities (cities with populations of over 10 million) in 2025 will be in the developing world (see map on the next page), it is clear that the investments required to provide for their future job and economic growth will not only be enormous but, in many cases, of a daunting magnitude.

The good news is that technology can and will help emerging cities bypass the need for much traditional infrastructure. Indeed, the most critical infrastructural issue in the mature cities of the West is the obsolescence of and urgent need to upgrade much of their basic infrastructure, which was built in many cases in the 19th and early 20th centuries. Emerging cities at least have the advantage in many areas of a blank slate: Mobile telephony in lieu of landlines is an obvious example. New technology and continual innovation—in everything from construction materials to urban transport to environmental remediation—will increasingly allow emerging cities to catch up with developed ones. More important, it will make it possible for them to

bring their citizens closer to the quality of life enjoyed by those in mature cities. In the words of Cisco's chief globalization officer, Wim Elfrink, "Technology can be a key enabler to transform societies." (See the interview on page 46; see also the interviews with Arup Group deputy chairman Andrew Chan, page 68, and Infosys founder N.R. Narayana Murthy, page 84.)

But it will be a long and difficult process. Just how difficult can be seen by the chart on page 23, "Productivity (GDP per worker per year) in thousands \$US, 2025." According to that chart, Mumbai's per worker GDP will be about 6.5 percent of New York's figure in 2025. It will be about 31 percent of that of Buenos Aires. Beijing's per worker GDP, meanwhile, will be slightly less than that of Johannesburg, and the figure for both cities will be less than a fifth of that of New York. For Beijing to catch up with New York's projected GDP per worker in the next 13 years, in other words, it will need essentially to more than quintuple its currently projected growth. That is not likely to happen.

4 The International Monetary Fund's World Economic Outlook Database provides GDP data for every country or region in a variety of subsets at <http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx>.

5 Again, IMF GDP data and projections for Africa are available at <http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx>.

6 Edward Glaeser, *Triumph of the City*, New York, 2011, p. 1.

But it doesn't have to. What needs to be done is for emerging cities simply to understand the dynamics of urbanization—the extent to which urbanization increases wealth and enhances social well-being—in order to map out a strategy of *viable* urbanization, to the benefit of the men and women who live in those cities now and will do so in increasing numbers in the future. It is telling that even in an enormous, continental nation such as the US, cities not only contain over 80 percent of the population but account for three-quarters of GDP and two-thirds of all jobs.

That is exactly what Harvard economist Edward Glaeser means by the “triumph of the city.” To wander through any successful city, he writes, “is to study nothing less than human progress.”⁷⁶ Because of the often seemingly impossible challenges to emerging cities, the reality of their extraordinary economic advantages is often buried in a blizzard of media images about slums, crime, and massive social insecurity. At best, however, these images reflect a half-truth—or, more accurately, the facts of cities that are only half-formed. Because it is only when cities reach their maximum efficiency that their economic and social

payback to their societies—in economies of scale for service provision and infrastructure costs, reduced energy use, and labor agglomeration—are at their peak.

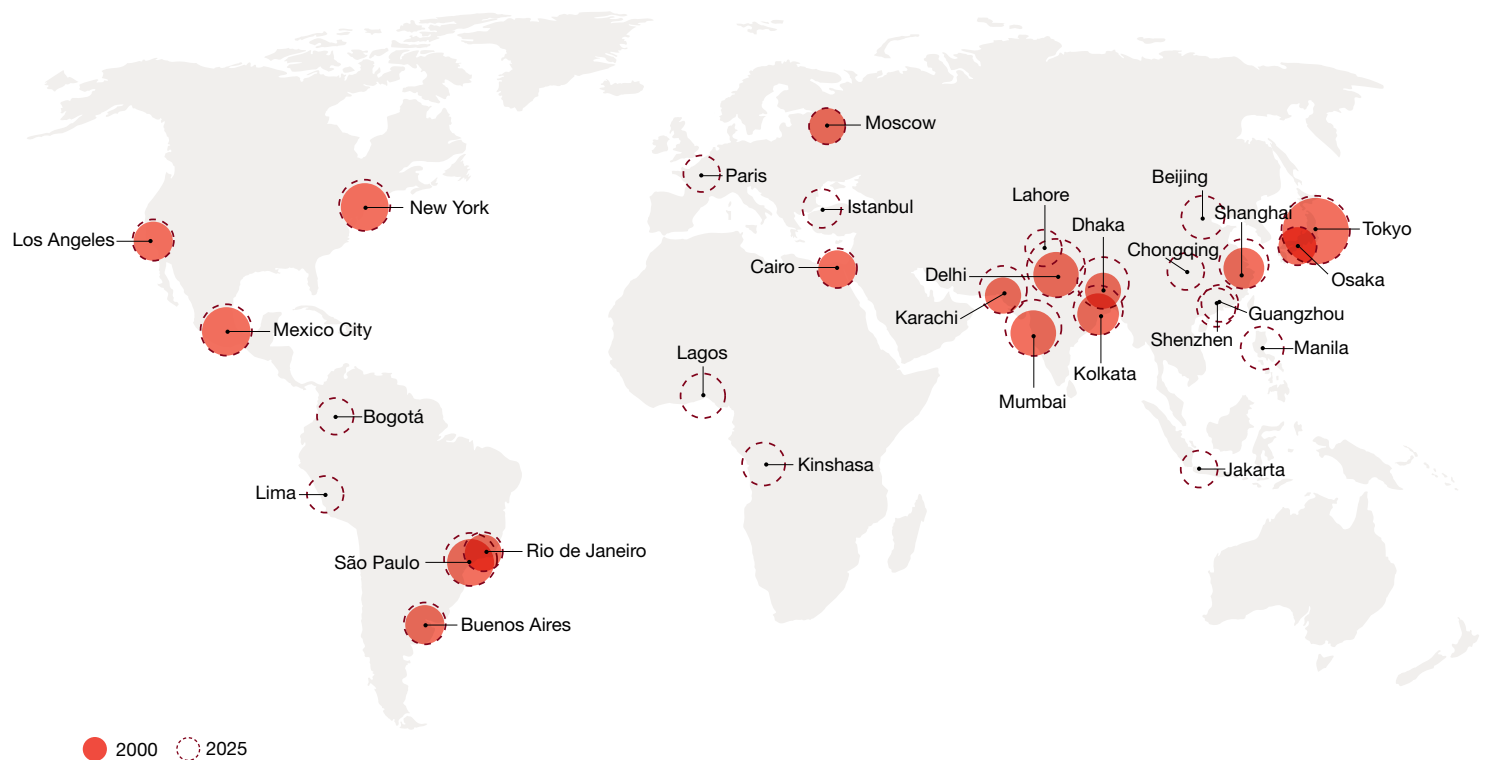
Seventy-eight percent of the developed world's population is urban today—almost twice the percentage in Africa or Asia. That figure will rise to 84 percent in Europe and 90 percent in the US by 2050. By contrast, Africa will still be only 62 percent urban and Asia 65 percent in 2050. Nonetheless, it will only be as they approach developed-city levels that developing cities will begin to see the economic and social benefits of urbanization. It is by increasing density and, therefore, those economies of scale mentioned above that cities become efficient, and extremely productive, centers of “human progress.”

It is, finally, precisely at the level of human progress—whether the term is defined as quality of life, standard of living, or both—that developed cities can be models for developing ones. While many of the developed world's urban centers have been rudely shaken by the global financial crisis, with unusually harsh ramifications for their social

infrastructure in many instances (see “A Tale of Three Cities,” page 88), all of them have the advantage of fully formed public sectors. While it is true that many municipalities in the eurozone (and the US) need to reorganize and retrench their public services—and, especially, to cut excessive and insupportable public spending—it is always easier to cut, or rearrange, than to start from scratch. Despite (and because of) their rapid growth, living standards remain very low in developing cities. But all cities go through this. The word “Dickensian” was born from the great English writer's descriptions of 19th-century London. Conditions in 18th-century Paris led to Europe's most famous revolution. For the first few decades of the 20th century, it was self-evident why the west side of midtown Manhattan was called Hell's Kitchen. In that sense, developed cities are no different from developing ones. A developing city is transformed into a “developed” one, in fact, the moment it decides, to echo Bill Bratton again, to ensure public safety, and then health and security. Once those fundamental tasks are accomplished, “the triumph of the city” is virtually preordained.

World megacities are multiplying

Cities with a population of 10 million or more in 2000 and 2025



The population figures in this table are based on the larger geography of a city's urban agglomeration and not the municipal population data used in the main *Cities of Opportunity* comparison. Source: *World Urbanization Prospects*, United Nations



Narayana Murthy of Infosys links

... India's urban future to the power of private enterprise, leadership, governance, and transparency

N.R. Narayana Murthy founded Infosys in 1981 and built it over three decades into a global software giant with 145,000 employees. Murthy, now chairman emeritus of Infosys, also serves on the boards of HSBC and the Ford Foundation. In praising his book, *A Better India, A Better World*, Bill Gates said Murthy “demonstrated that it’s possible to create a world-class, values-driven company in India,” while India’s Prime Minister Manmohan Singh hailed Murthy as “a role model for millions of Indians.” Here, Murthy discusses India’s urban challenges—and how to tackle them with the help of government reform, “huge foreign investment,” and entrepreneurial dynamism.

India’s economy is growing rapidly, its population is expanding at an extraordinary rate, and there’s massive migration from the countryside to cities that are already overcrowded. How concerned are you about the stress all of this places on urban infrastructure such as roads, the water supply, and the electricity system?

It’s a big challenge, there’s no doubt at all. The country is progressing very fast. We grew at 8.5 percent on average over the last five years. When the economy grows at this rate, it’s only natural that there’s huge pressure on infrastructure. Even though we’ve

been building infrastructure, we’re not able to keep pace with demand. That results in huge productivity losses and delays, mainly in urban areas.

Where do you see the most acute strains?

Transportation takes an enormous amount of time. Our roads haven’t been developed as quickly as our logistical demands require. Also, the average speed of our freight trains today must be about 40 mph, which is no speed in 2012. We’re not adding a lot more railway lines. We’re not expanding roads or improving their quality.



So the movement of goods takes a long time. Similarly, our port infrastructure is not as developed as we'd like. The average time for clearance at our ports is several days, whereas it's several hours in many countries. For India's economy to make sustained progress, we have to build good roads, build ports, bring efficiency to these systems, and also enhance our power capacity.

How economically disruptive is the logjam on roads in Indian cities like Mumbai, Delhi, and Bangalore?

We're adding about 4 million vehicles every year and about

11 million two-wheelers, but the roads are not expanding. When I leave my home in south Bangalore at 7 a.m., it takes me only 20 minutes to drive to Electronics City [the industrial park in Bangalore where Infosys is headquartered]. But if I leave at 8.30 a.m., it takes an hour—and this is one of Bangalore's better roads. Before it was built, I'd spend two and a half hours waiting in traffic to come to the office or get home, and this is still the norm in many parts of this city and other Indian cities. These traffic conditions reduce your productivity and waste your time, and you're not in a very good mood when you've just spent two and a half hours in traffic.

In Aravind Adiga's recent novel *Last Man in Tower*, an exasperated resident of Mumbai complains: "Look at the trains in this city. Look at the roads. The law courts. Nothing works, nothing moves; it takes ten years to build a bridge." Why do such things function so inefficiently in India's cities? Is there a cultural reason why Indians accept these frustrations?

Yes. Somehow, the staple diet of Indians is apathy. We see a problem and don't do much about it. The government doesn't act with

When the economy grows at this rate, it's only natural that there's huge pressure on infrastructure. Even though we've been building infrastructure, we're not able to keep pace with demand. That results in huge productivity losses and delays, mainly in urban areas.

a sense of alacrity; there's so much legislation still pending with the parliament. What many countries take six months to complete, we most often take several years to do. Our nature, our natural pastime, is apathy. My interpretation is that it's because we were under foreign rule for the last millennium, until we got independence from the British in 1947. We weren't in control of our destiny, so we weren't responsible for designing a better strategy for our society. It's natural for a nation like that to take a little time to bring back a sense of urgency, self-created destiny, and alacrity.

Is that what entrepreneurs like you have injected into Indian society?

I think so. I have a fetish for quick action because of the apathy I see around me. My children make fun of me: They say, "We shouldn't discuss anything with dad because he'll go ahead and do it immediately!" But there are many people in the country, particularly in the private sector, who have now realized the importance of speed.

Over the last 20 years, much of India's progress has been driven by the dynamism of the private sector—not least in the technology industry, which has transformed Bangalore into the so-called "Silicon Valley of India." What should the government do to foster more entrepreneurship?

First, we have to enhance the quality of our higher education system by creating greater interaction with well-known universities in developed countries. Second, we need regulations that attract the best venture-capital firms to India in even greater numbers. Third, we have to create a business environment for entrepreneurs where there's very little friction created by bureaucrats. Today, it takes several days to even register a firm. And smaller entrepreneurs suffer under the tyranny of petty bureaucracy in terms of factory inspectors, tax inspectors, and so on. We need to shield them from this bureaucratic tyranny. Fourth, we need to create an environment in which failure is not seen as highly negative. If you fail as an entrepreneur in the US, it is in many ways a badge of honor; we in India need to have the same mindset as in America.

India has done well to get to the current orbit. But to move to the next orbit, we need good leadership. To bring prosperity to the vast majority of Indians, we need to enhance our governance system, enhance our transparency and accountability, combat corruption, and enhance our infrastructure.

How well has privatization worked in addressing economic bottlenecks such as India's inadequate supply of electricity?

Power production is open to the private sector, but power distribution is still in the government's hands in most states, so it's not working that well. There are huge losses in transmission, and there's a lot of theft of electricity. Several state governments give free power to farmers, which is causing some strain, and the state governments aren't able to pay power manufacturers on time. So, it's a mixed bag. Unfortunately, we've looked at this situation piecemeal, not holistically. The solution is to look at the entire supply chain and bring in the participation of the private sector.

Does the success of technology companies like Infosys suggest that private enterprise is the most effective driver of economic progress in India, not the government?

The software industry is a good example of how the private sector can add tremendous value to the economy if the government takes a back seat and acts as a catalyst. In our area, the government did a good job of promoting the Indian software industry abroad. The moral of the story is that the government should become a catalyst, listening to the people in

the trenches who are producing goods and services, then creating laws and rules that will make them more competitive.

Thomas Friedman, author of *The World is Flat*, has written that India's government is failing to confront urgent issues like urban pollution and poor infrastructure. He warns: "As much as I'm impressed by the innovative prowess of India's young technologists, without a government to enable them with the roads, ports, bandwidth, electricity, airports, and smart regulations they need to thrive, they will never realize their full potential." Is he right?

Absolutely. India has done well to get to the current orbit. But to move to the next orbit, we need good leadership. To bring prosperity to the vast majority of Indians, we need to enhance our governance system, enhance our transparency and accountability, combat corruption, and enhance our infrastructure.

The government has called for \$1 trillion in infrastructure spending. How can this be funded when India's finances are already stretched?

Developing nations like India need to seek huge foreign investment and huge debt from abroad to build our infrastructure, then make ourselves more productive

and competitive on a global scale, sell more, then pay back these loans. There's no other model in the world. It's happening in some areas already: India's IT industry is very competitive. But it has to happen in many other industries.

What advice would you give to foreigners looking to invest in India?

One of the drawbacks of our system is that the rules and regulations are not very transparent. They're not very explicitly written in simple English that can be understood by you and me in the same way. Therefore, there's an opportunity for misinterpretation by the bureaucracy—and, when there's an opportunity for misinterpretation, there's a possibility for rent-seeking. That's something that foreign investors don't like because they're used to open, clear rules. So, I'd advise foreign investors to use well-known Indian lawyers and make sure these lawyers look very carefully at whatever contracts they're writing, and also look at all the previous case studies.

Some foreign investors are also scared that corruption may still be too pervasive in India. How hard is it to avoid corruption?

In fairness, at Infosys, we've not paid a single cent in bribes in the last 30-odd years of our existence.

Therefore, I do believe it's possible to do business with the government without any bribery as long as you're willing to accept a certain delay in the processing of applications and approvals. And if you demonstrate that you're not going to give any bribes the first time, the second time they won't ask you. So my advice to any foreign investors is to be firm in being honest and not succumbing to any such bribery situations the first time; the second time, you won't have to worry about it.

One growing challenge is urban pollution, not only in megacities like Mumbai, but in lesser-known cities like Kanpur and Ludhiana, which both rank very high in lists of the world's most polluted places. Is the government addressing these environmental concerns—for example, by embracing alternative energy?

The government has created incentives in wind power, solar

power, and biomass, but the majority of our power comes from coal, and that's not good for the environment. We've been trying to install nuclear power, but there's been a lot of opposition because of what happened in Japan. I wouldn't fault our government on its enthusiasm for making alternative energy more popular. But the reality is that we'll continue to use more and more coal for quite a few years—and we're also adding automobiles like there's no tomorrow, which causes tremendous damage to the environment.

India has made spectacular progress over the last 20 years. When you look at the next 20 years, what makes you hopeful?

I've seen a new sense of confidence and hope amongst Indians in the last 12 years as they've watched our country moving forward, our GDP growth rates increasing, our software

companies succeeding, our banks becoming smarter and smarter. Therefore, even though we have problems, there's confidence today that we'll be able to solve them—if not tomorrow, then at least the day after. That's the biggest transformation I've seen in the psyche of India. This confidence is extremely important for a nation on the go.

Infosys Electronics City, Bangalore.



A tale of three cities

Dubai recovers strongly, Dublin tries to turn the corner, and Athens slogs on wearily

To paraphrase Tolstoy's famous opening to *Anna Karenina*, while most happy cities are alike, every unhappy city is unhappy in its own way. Although the pain and suffering (and, in some cases, tragedy) provoked by the global financial crisis during the last few years have had common causes, and certainly been manifested in much the same way (unemployment, foreclosures, bankruptcies), each city that has undergone these wrenching events has had a very different history.

Diagnostically, that means that each city arrived at its crisis through a different set of factors and causes, which is also why each one's revival and future well-being will follow a different path. While it is true that cities in the eurozone—from Lisbon and Madrid to Paris and Rome—share fundamental problems arising from the single currency, each has a different past (and future) that makes its specific prognosis for potential economic health distinctive and not comparable. Focusing on Athens, Dublin, and Dubai, three of the most conspicuous examples of urban crisis during the last several years, will illustrate the extent to which it is more the differences rather than the commonalities that distinguish economic breakdown and recovery in a city.

Dubai had a prominent collapse of its real estate market in the late fall of 2009.¹ Very quickly, Abu Dhabi came to the rescue of its sister emirate with a \$10 billion bailout.² To a very real extent, Dubai was a victim of the worldwide financial crisis following the collapse of Lehman Brothers in September 2008. Although Dubai's accumulated debt of about \$120 billion was mostly from real estate it had built and reasonably expected to lease, these investments immediately became identified with the global real estate bubble that burst simultaneously in so many countries at the time.

But some bubbles are less frothy than others.

As far back as December 1, 2009—two weeks before Abu Dhabi came to the rescue of its sister city—Harvard economist Edward Glaeser was presciently warning people against a rush to judgment. In his *New York Times* blog, he pointed out that while Dubai had “massively overbuilt relative to ... current demand” and that “extreme height” in skyscraper construction is “a bellwether of irrational exuberance,” it was also true that “it took more than a decade for the Empire State to stop being the ‘Empty State Building.’” In fact, Glaeser reminded us, five of the 10 tallest buildings in New York were planned during the Roaring (and very bubbly) '20s but were actually built during the Depression. “Great cities,” Glaeser remarked, “have long been built by great gamblers,” and concluded: “Even if Dubai's real estate prices continue to drop, which is certainly quite possible, there will remain a strong incentive to fill its buildings. If the structures remain occupied, then Dubai ... will survive.”³

As it turned out, while Dubai experienced an 18 percent drop in GDP between 2008 and 2009, it actually grew 3.4 percent in 2011 and is expected to grow 3.7 percent this year, 3.9 percent in 2013, and to return to its pre-recession peak by 2014.⁴ Even more important, at least as far as the actual repercussions on the city's population, Dubai has never suffered the debilitating unemployment that has been the most devastating consequence of financial disaster in every other city. Thus, while the economy lost almost a fifth of its value in just one year, it only shed 3,000 jobs. By the following year, in fact, total employment had *increased* by 30,000. The city is now projected to gain an average of 45,000 jobs annually through 2025.

The reasons for this relatively benign employment environment are unique to Dubai. First of all, despite (or perhaps because of) Abu

Dhabi's financial intervention, whatever marginal job loss occurred during the city's crisis was made up by increased hiring in the public sector, which added more than 61,000 jobs between 2008 and 2010. Moreover, and as counterintuitive as it may appear, although the city's troubles originated in the real estate sector, employment in construction has actually *grown*, by roughly 37,000 jobs during the same period. If nothing else, this confirms the wisdom of Edward Glaeser's prediction that Dubai would indeed survive this temporary financial hiccup in its development as “a great metropolis.”⁵

Moving to Dublin, the second of our three cities under examination, we come across a decidedly grimmer landscape. Gone are the days when Dublin was toasted in think tanks and investment conferences around the world as the capital of the “Celtic Tiger” and heart of the “Irish Miracle,” as Ireland averaged annual GDP growth of over 7 percent from 1995-2007, and even hit stratospheric heights of 10-11 percent several years during that period, while the European Union was averaging 2.2 percent.⁶ By 2008, and the onset of the global financial crisis, Ireland's real estate bubble had burst and GDP had fallen by 3 percent.⁷

The consequences for Dublin have been harrowing. In 2007, with employment expanding at an annual rate of 3.5 percent during the previous decade, the city's unemployment rate stood at 4.5 percent; by 2011, it had more than tripled to 14.2 percent. Youth unemployment has increased 150 percent, shooting up from 8,000 to almost 20,000.

1 Unless otherwise stated, all data in this article are from research undertaken for the *Cities of Opportunity 2012* report.

2 See Landon Thomas Jr., “Abu Dhabi Tightens Its Grip as It Offers Help to Dubai,” *The New York Times*, December 14, 2009.

3 See Edward L. Glaeser, “The Ascent, and Fall, of Dubai,” *Economix*, *The New York Times*, December 1, 2009, at <http://economix.blogs.nytimes.com/2009/12/01/the-ascent-and-fall-of-dubai>.

4 For 2011, see “Dubai economy grows by 3.4 pct. in 2011,” Reuters, May 29, 2012, at <http://www.reuters.com/article/2012/05/29/dubai-gdp-idUSL5E8GT1LH20120529>; for 2012 and 2013 projections, see the chart “Dubai Government Debt Sustainability, 2007–17,” International Monetary Fund, IMF Country Report No. 12/116, *United Arab Emirates: 2012 Article IV Consultation*, May 2012, page 12.

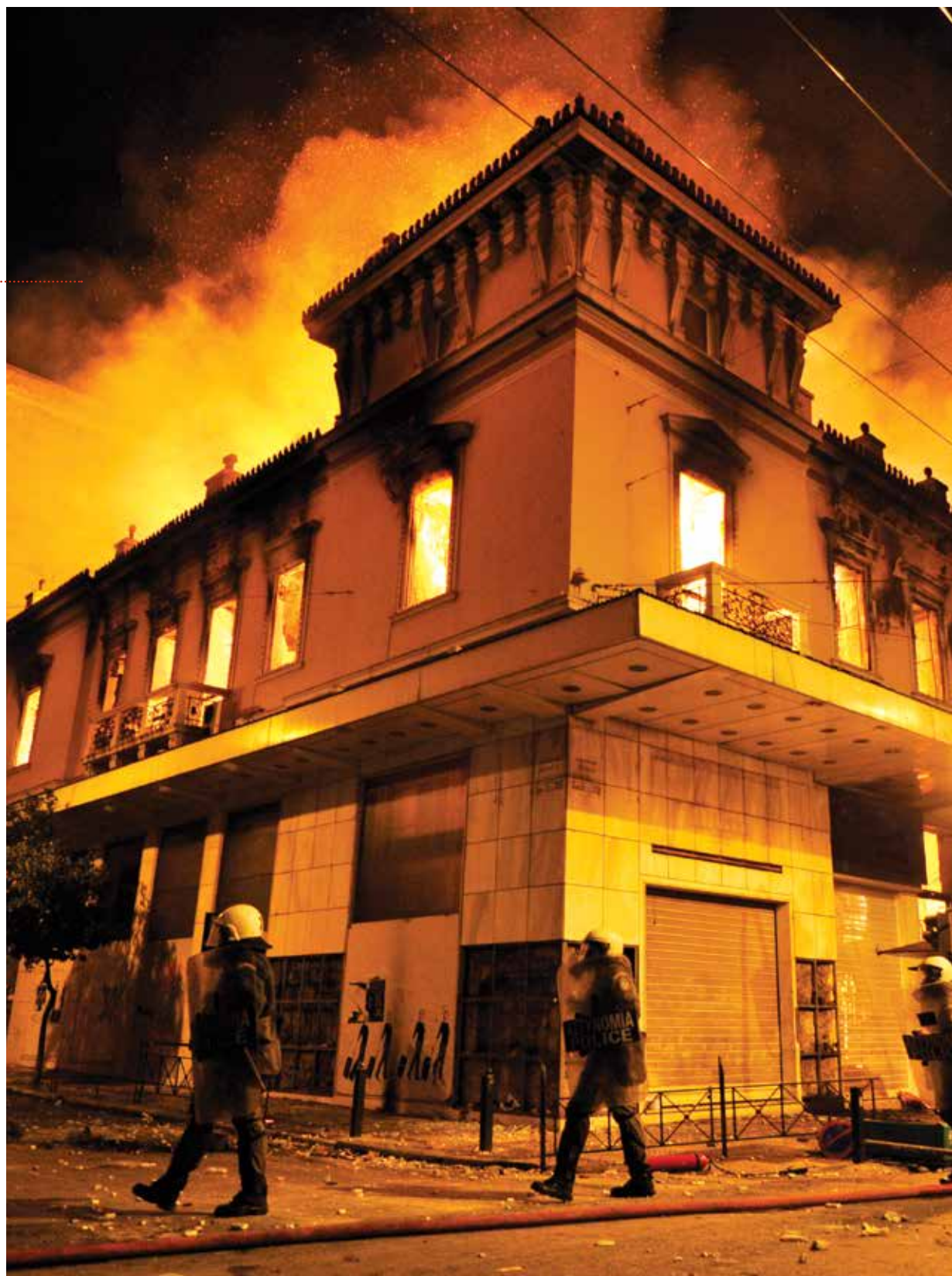
5 Glaeser, “Ascent and Fall.”

6 See the chart, “Real GDP Growth 1993-2009,” in National Treasury Management Agency, *Ireland: Information Memorandum March 2008*, page 16. The growth rate of 10-11% was achieved in 1995, 1997, and 1999.

7 For 2008 GDP, see Table 1, “Ireland: Selected Economic Indicators, 2008–13,” International Monetary Fund, IMF Country Report No. 12/48, *Ireland: Fifth Review Under the Extended Arrangement—Staff Report; Staff Supplement; Press Release on the Executive Board Discussion*, March 2012, page 25.

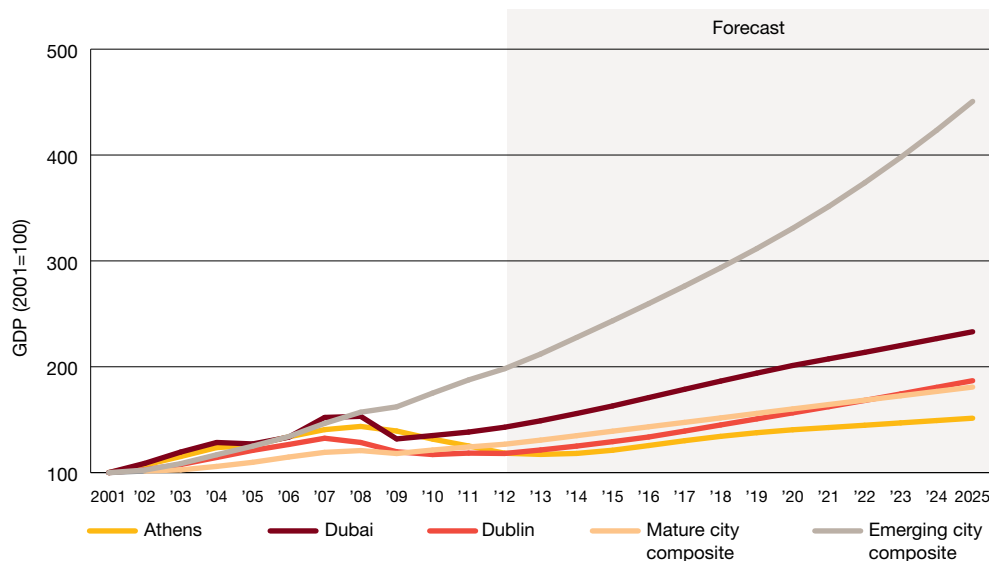
Athens, Dublin, and Dubai illustrate the extent to which it is more the differences rather than the commonalities that distinguish economic breakdown and recovery in a city.

Riot police walk past the Attikon cinema in central Athens, just a few blocks from Constitution Square, after it was set ablaze during massive clashes with protesters on February 12 of this year. Opened in 1912—in a neoclassical building dating from 1870—the Attikon hosted the annual Athens International Film Festival and was celebrating its centenary this year as one of the longest operating movie theaters in the country and in Europe as a whole.



How economic growth compares among the three cities and Cities of Opportunity averages

2001-2025



Source: Oxford Economics, Cities of Opportunity

Meanwhile, since the housing bubble exploded, everyone for whom their home was their major asset has been impoverished, as current housing prices have plummeted to half their 2007 value. Of course, the cost of housing had almost quadrupled in the prior decade, rising from an average of €108,000 to €415,000, but all those who bought houses as the real estate bubble inflated (as so many did) are now underwater on their mortgages, saddled with homes they can no longer afford. In a story published last year, *New York Times* correspondent Liz Alderman quoted a demoralized father of three saying, “It’s like we drew the lottery ticket made in hell.”⁸

The figures point to the Dantesque terrain. Dublin’s economy has lost 11 percent of its value in the period from 2007 to 2012, or approximately \$6.5 billion. Employment has plunged 15 percent, and unemployment is projected to remain above 10 percent until 2018. At the same time, the job losses over the last five years have been spread across a wide spectrum of sectors. Joblessness as a whole is not expected to recede to pre-crisis levels until after 2025, at the earliest.

But it is surely Athens that has become the emblem of the global financial crisis. The images on television screens throughout the world of the fires periodically raging in

Constitution Square in the heart of the Greek capital are the obvious illustration of an economy that has crashed and continues to burn.

While neither Dublin nor Athens is projected to return to its pre-collapse levels of unemployment until after 2025, joblessness in Athens started at both a higher level than in Dublin—6.5 percent as opposed to 4.5 percent in 2007—and is currently much worse: at the end of 2011, it stood at 20 percent, as against Dublin’s 14.2 percent mentioned above. Moreover, youth unemployment is over 50 percent in Athens, while it stands at 29 percent in Dublin.⁹

It is precisely this dynamic of continually increasing unemployment that seems to be spiraling out of control in Greece, having shot up from 15.7 percent to 21.7 percent in just the last 10 months of 2011 (as opposed to the corresponding Irish increase of 14.1 percent to 14.7 percent during the same period).¹⁰ Furthermore, while Dublin has managed to eke out some job gains in the last few years in transport and communications, Athens’s job losses have not spared any sector of the economy and have devastated two critical areas of previous job growth, construction and manufacturing, which have both shed at least 50 percent of their respective workforces.

GDP as a whole has also dropped much more precipitously in Athens than in Dublin, losing 18 percent of its value from 2008 to 2012. More ominously, while Dublin is expected to return to its pre-crisis peak in four years, Athens is not forecast to get back to its peak for at least another decade. There is, however, one positive area of comparison: Housing prices have fallen only 20 percent in Athens in the past four years while halving in Dublin, and most banks are restructuring loans rather than foreclosing. In the words of one banker, “Taking away the home of a particular family tears apart the social fabric of an already stressed society.”¹¹

In the end, the future for each of these three cities appears as different as their respective pasts—although two of them, Dublin and

8 Liz Alderman, “After Bust in Ireland, Ordinary People Make Do With Less,” *The New York Times*, May 6, 2011.

9 See David McWilliams, “This is a fiscal straightjacket for Ireland, not a union,” *Financial Times*, May 28, 2012, for the 29% rate of youth unemployment.

10 For unemployment rates from March 2011 to January 2012, see Eurostat’s news release, “Euro area unemployment rate at 10.9%,” STAT/12/67, May 2, 2012, at <http://europa.eu/rapid/pressReleases-Action.do?reference=STAT/12/67&type=HTML>. Although the figures are national, they are representative of trends in the two capitals. It is noteworthy that Ireland shows a drop in unemployment in March 2012 of 0.2% to 14.5%.

11 See Rob Urban and Sharon Smyth, “Greek Banks Follow Euripides To Help Borrowers: Mortgages,” *Bloomberg*, July 27, 2012, at <http://www.bloomberg.com/news/2012-07-26/greek-banks-follow-euripides-to-help-borrowers-mortgages.html>.

Athens, are linked in a common, supranational institutional framework (and, for the time being at least, a common currency) that will seriously affect the extent to which they do, or do not, recover in the coming years. As mentioned, Dubai has already left its past behind it and is moving ahead robustly and confidently.¹² With the assistance of Abu Dhabi, it ensured that its crash was of short duration, without longer lasting consequences, and, above all, as painless as possible.

The two European cities have a much more difficult future ahead of them and, in the case of Athens, a truly daunting one. The outlook for Dublin is definitely brighter than for the Greek city, even if only comparatively, especially if the working hypotheses for both cities' futures is based on their past economic performance—which is truly where the two cities reveal their very different selves.

In the ensuing disorder following the various economic meltdowns in the EU, it has been forgotten (or ignored) that, from 2000 to 2007, Dublin was capital of a nation whose government finances were in surplus to the tune of an average of 1.4 percent of GDP, whereas Athens was capital of a nation whose budget deficits during that time averaged 5.4 percent.¹³ In addition, during the same time, Ireland's general debt averaged an astoundingly low 29.8 percent of GDP, just under half the relevant EU limit, while Greece's came in at a whopping 102.6 percent, 70 percent above EU rules.

Thus, what happened in Ireland had absolutely nothing to do with profligate public spending. The exact opposite, in fact. The sovereign sacrificed its fiscal integrity, and future, when it decided to cover the debts that resulted from the truly profligate expansion of the private sector, in this case the banks. If nothing else, these facts illustrate that fiscal responsibility would be a reversion to the norm for the Irish. Dublin's key weakness, which led to its crisis, was its asset bubble. Consequently, as it stabilizes and then slowly returns to growth, Dublin, and Ireland as a whole, faces the same structural challenge as Dubai: to diversify its economy and ensure that it will never again be held hostage to this kind of bubble (or to one particular economic sector). It must also be said, in all justice, that the "Celtic Tiger" was not all myth. The "Irish Miracle" might have turned out to be considerably less miraculous than touted to be at the time, but there can be no doubt that a robust

economic structure was put in place—and that this structure is far from ruined and will ultimately prove a haven for Dublin.

Athens has, by far, the most uncertain future, or at least the one that is most difficult to predict with any reasonable assurance other than to repeat the obvious: the city's deadly link to a Greek state that was, and remains (as opposed to the Irish state), inefficient, over-indebted, and underfunded (primarily because of tax evasion). Athens is also the nucleus of an economy that is uncompetitive, risk-averse, and inward-looking (again, the very opposite of Dublin). Athens is the metropolitan center, in other words, of

a multiple dysfunctionality—political, economic, and now social—that will take many years to set right.

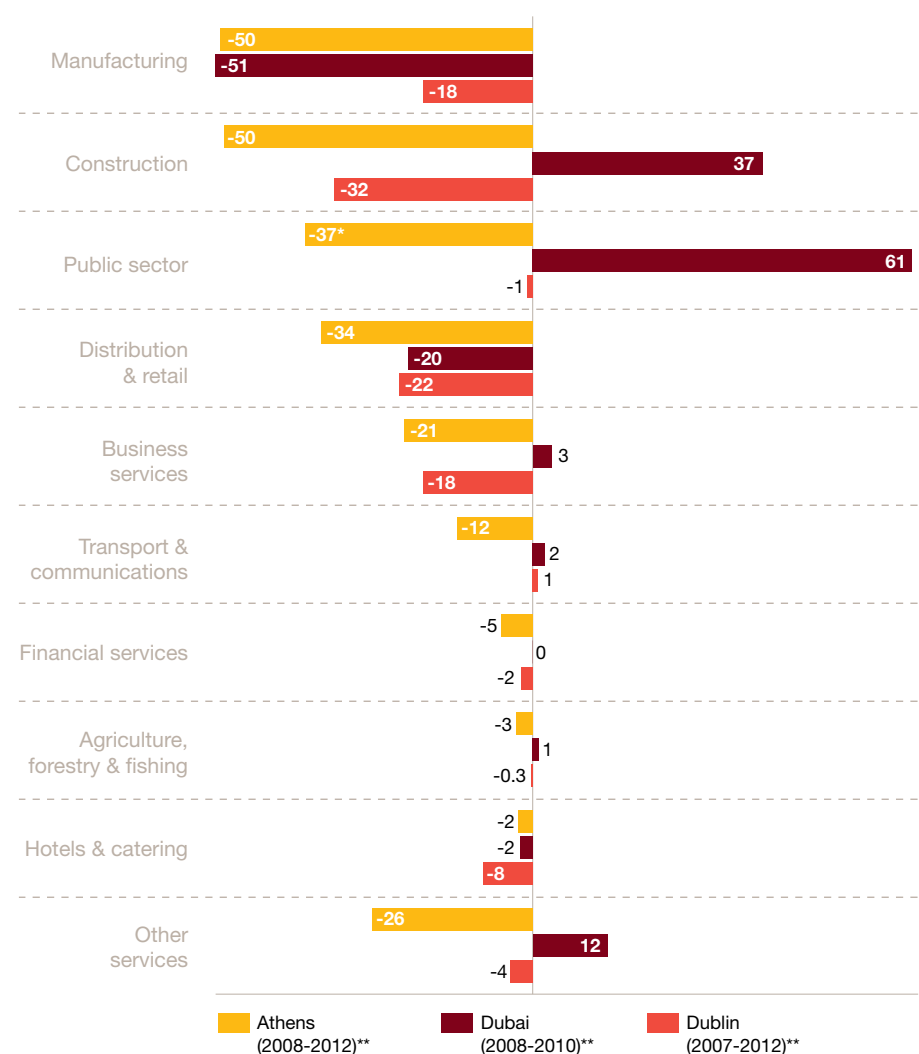
Having arrived at its crisis through a different set of factors and causes, each city's revival and future well-being will therefore follow a different path.

¹² The IMF warns, however, that the "large property overhang continues to be a drag on the economy" and that credit to the private sector has essentially remained flat for the last three years. See IMF Country Report No. 12/116, especially pages 4-7.

¹³ The averages above were calculated on the basis of Eurostat's data; see the table, "General government deficit/surplus: Percentage of GDP," at http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TSIEB080. Interestingly, Ireland was a much more stringent observer of the eurozone's fiscal stability criteria than Germany, whose own deficits during the same period averaged 2.3%, or over 150% more than Ireland's surpluses.

Sectoral employment change for Athens, Dubai, and Dublin

Employment change in thousands



*The figure for Athens refers to future and expected job cuts, none of which have yet taken place.

**Date range reflects years of falling employment in each city.

Source: Oxford Economics, Cities of Opportunity

Key to the Variables

Air pollution

Measure of outdoor air pollution levels based on annual mean concentrations of particulate matter 10 micrometers (PM10) in diameters or less, which reflect the degree to which urban populations are exposed to this fine matter. Figures are based on daily measurements or data that could be aggregated into annual means. In the absence of annual means, measurements covering a more limited period of the year were exceptionally used. Figures were sourced from the World Health Organization's Public Health and Environment database, which is of global scope aiming to provide data at both national and city levels.

Aircraft movements

Count of air traffic movements at each of the major airports servicing a city, including civil international and domestic passenger, cargo, and non-revenue flights but excluding military flights.

Airport to CBD access

A measure of the ease of using public transit to travel between a city's central business district and the international terminal of its busiest airport in terms of international passenger traffic. Cities are separated into categories according to whether a direct rail link exists; if so, the number of transfers required; and if not, whether there is a public express bus route to the airport. Cities with direct rail links are preferred to those with express bus services. Cities with rail links with the fewest transfers are ranked higher than those with more. Within categories, cities are ranked against one another according to the cost of a single one-way, adult weekday trip and the length of the trip, with each factor weighted equally.

Attracting FDI: Capital investment

Total value of greenfield (new job-creating) capital investment activities in USD in a city that are funded by foreign direct investment. Data cover the period from January 2003 through July 2011. Figures provided by fDi Intelligence.

Attracting FDI: Number of greenfield projects

Number of greenfield (new job-creating) projects in a city that are funded by foreign direct investment. Data cover the period from January 2003 through July 2011. Figures provided by fDi Intelligence.

Broadband quality score

Measurement of the quality of a broadband connection in a given country using the Broadband Quality Study. This index is calculated based on the normalized values of three key performance parameter categories: download throughput, upload throughput, and latency. A formula weights each category according to the quality requirements of a set of popular current and probable future broadband applications. The Broadband Quality Study is an index produced by SAID Business School University of Oxford and Universidad de Oviedo, sponsored by Cisco.

Classroom size

Number of students enrolled in public primary education programs divided by the number of classes in these programs. Primary education programs usually begin at ages five to seven and last four to six years.

Consumer price index

A relative measure of the price of consumer goods by location, including groceries, restaurants, transportation, and utilities. The CPI measure does not include housing expenses such as rent or mortgage. Figures provided by Numbeo, a worldwide cost-of-living database.

Cost of business occupancy

Annual gross rent divided by square feet of Class A office space. Gross rent includes lease rates, property taxes, maintenance, and management costs. Data produced by CBRE Global Office Rents.

Cost of Internet

The current monthly price for Internet service (6 mbps) with unlimited data using cable or ADSL (in USD). Figures provided by Numbeo, a worldwide cost-of-living database.

Cost of public transport

Cost of the longest mass transit rail trip within a city's boundaries. The cost of a bus trip is used in the cities where there are no rail systems.

Cost of rent

Monthly rent for a one-bedroom apartment in the city center (in USD). Figures provided by Numbeo, a worldwide cost-of-living database.

Crime

Amount of reported crimes in a city such as petty and property crimes, violent crimes, and street crimes. Data are from the Mercer Quality of Living reports.

Cultural vibrancy

Weighted combination of city rankings based on: the quality and variety of restaurants, theatrical and musical performances, and cinemas within each city; which cities recently have defined the "zeitgeist," or the spirit of the times; and the number of museums with online presence within each city. The "zeitgeist" rankings take into account cultural, social, and economic considerations.

Digital economy score*

Assessment of the quality of a country's information and communications technology (ICT) infrastructure and the ability of its consumers, businesses, and governments to use ICT to their benefit. Data were sourced from the digital economy rankings, "Digital Economy Rankings 2010—Beyond E-readiness," by the Economist Intelligence Unit.

Ease of entry: Number of countries with visa waiver*

Number of nationalities able to enter the country for a tourist or business visit without a visa. Excludes those nationalities for whom only those with biometric, diplomatic, or official passports may enter without a visa.

Ease of starting a business**

Assessment of the bureaucratic and legal hurdles an entrepreneur must overcome to incorporate and register a new firm. Accounts for the number of procedures required to register a firm; the amount of time in days

required to register a firm; the cost (as a percentage of per capita income) of official fees and fees for legally mandated legal or professional services; and the minimum amount of capital (as a percentage of per capita income) that an entrepreneur must deposit in a bank or with a notary before registration and up to three months following incorporation. Assessment scores gathered from Doing Business 2012, The World Bank Group.

Employee regulations**

Sum of three rank scores from the World Bank's Doing Business study including: ratio of minimum wage to average value added per worker; notice period for redundancy dismissal (for a worker with 20 years of tenure, in salary weeks); and paid annual leave for a worker with 20 years of tenure (in working days).

End of life care*

Ranking of countries according to their provision of care for their citizens at the end of their lives taking into account the basic healthcare environment, availability, cost, and quality of care. The Quality of Death Index scores countries across four categories: Basic End-of-Life Healthcare Environment; Availability of End-of-Life Care; Cost of End-of-Life Care; and Quality of End-of-Life Care. These indicator categories are composed of 27 variables, including quantitative, qualitative, and "status" (i.e., whether or not something is the case) data. The indicator data are aggregated, normalized, and weighted to create the total index score. Quality of Death is an Economist Intelligence Unit index report commissioned by the Lien Foundation.

Entrepreneurial environment*

Measurement of the entrepreneurial attitudes, entrepreneurial activity, and entrepreneurial aspirations in a country using the Global Entrepreneurship Index (GEINDEX). The GEINDEX integrates 31 variables, including quantitative and qualitative measures and individual-level data and is produced by the Center for Entrepreneurship and Public Policy, George Mason University.

Financial and business services employment

Number of jobs in financial and business services activity as a share of total employment in the city. Financial services includes "banking and finance," "insurance and pension funding," and "activities auxiliary to financial intermediation." Business services includes a mix of activities across the following subsectors: "real estate and renting activities"; "IT and computer related"; "R&D"; "architectural, engineering, and other technical activities"; "legal, accounting, bookkeeping, and auditing activities, tax, and consultancy"; "Advertising"; and "Professional, scientific, and technical services and business services where not elsewhere classified." Data sourced by Oxford Economics.

Flexibility of visa travel*

Ranking based on the number of visa waivers available for tourist or business visits and the length of time for which the visa waiver is granted. Ranking is based on the number of those countries that grant a waiver for at least 90 days, excluding those countries whose residents can enter without a visa only if they have a biometric, diplomatic, or official passport.

Foreign embassies or consulates

Number of countries that are represented by a consulate or embassy in each city. Figures sourced from Go Abroad.com.

Health system performance*

Measurement of a country's health system performance made by comparing healthy life expectancy with healthcare expenditures per capita in that country, adjusted for average years of education (as years of education are strongly associated with the health of populations in both mature and emerging countries). Methodology adapted from the 2001 report, "Comparative efficiency of national health systems: Cross-national econometric analysis."

Hospitals

Ratio of all hospitals within each city accessible to international visitors for every 100,000 individuals of the total population.

Hotel rooms

Count of all hotel rooms within each city.

Housing

Measure of availability, diversity, cost, and quality of housing, household appliances, and furniture, as well as household maintenance and repair. This measure is produced by the Mercer Quality of Living reports.

Incoming/Outgoing passenger flows

Total number of incoming and outgoing passengers, including originating, terminating, transfer, and transit passengers in each of the major airports servicing a city. Transfer and transit passengers are counted twice. Transit passengers are defined as air travelers coming from different ports of departure who stay at the airport for brief periods, usually one hour, with the intention of proceeding to their first port of destination (includes sea, air, and other transport hubs).

Innovation Cities Index

The index comprises 331 cities selected from 1,540 cities based on basic factors of health, wealth, population, geography. The selected cities had data extracted from a city benchmarking data program on 162 indicators. Each of the benchmarking data was scored by analysts using best available qualitative analysis and quantitative statistics. (Where data were unavailable, national or state estimates were used.) Data were then trend-balanced against 21 global trends. The final index had a zeitgeist (analyst confidence) factor added and the score reduced to a three-factor score for cultural assets, human infrastructure, and networked markets. For city classification, these scores were competitively graded into 5 bands (Nexus, Hub, Node, Influencer, Upstart). The top 33 percent of Nexus and Hub (and selected Node cities of future interest) final graded scores were ranked by analysts based on trends over two to five years. A Node ranking is considered globally competitive. The index is produced by 2Thinknow Innovation Cities™ program.

Intellectual property protection*

Leading business executives' responses to the question in the World Economic Forum's Executive Opinion Survey 2010 that asks, "How would you rate intellectual property protection, including anti-counterfeiting measures, in your country? (1=very weak; 7=very strong)." The survey covers a random sample of large and small companies in the agricultural, manufacturing, non-manufacturing, and service sectors.

International tourists

Annual international tourist arrivals for 100 cities collected by Euromonitor International. Euromonitor's figures include travelers who pass through a city, as well as actual visitors to the city.

Internet access in schools*

Leading business executives' responses to the question in the World Economic Forum's Executive Opinion Survey 2010 that asks, "How would you rate the level of access to the Internet in schools in your country? (1=very limited; 7=extensive)." The survey covers a random sample of large and small companies in the agriculture, manufacturing, non-manufacturing, and service sectors.

iPod index

Working hours required to buy an iPod nano (8 GB). Data sourced from UBS Prices and Earnings report.

Level of shareholder protection**

Measurement of the strength of minority shareholder protection against misuse of corporate assets by directors for their personal gain. The Strength of the Investor Protection Index is the average of indices that measure "transparency of transactions," "liability for self-dealing," and "shareholders' ability to sue officers and directors for misconduct." Assessment scores gathered from Doing Business 2012, The World Bank Group.

Libraries with public access

Number of libraries within each city that are open to the public divided by the total population and then multiplied by 100,000.

Licensed taxis

Number of officially licensed taxis in each city divided by the total population and then multiplied by 1,000.

Literacy and enrollment*

Measurement of a country's ability to generate, adopt, and diffuse knowledge using data from the World Bank's Knowledge Index category, education and human resources. The variables that compose education and human resources are adult literacy rate, secondary education enrollment, and tertiary education enrollment.

Major construction activity

Count of "under construction" buildings in the SkyscraperPage database for each city under way as of December 19, 2011. This includes structures such as highrises, stadiums, towers, and lowrises.

Mass transit coverage

Ratio of kilometers of mass transit track to every 100 square kilometers of the developed and developable portions of a city's land area. A city's developable land area is derived by subtracting green space and governmentally protected natural areas from total land area.

Math/Science skills attainment*

Top performers' combined mean scores on the math and science components of the Program for International Student Assessment (PISA), an Organization for Economic Co-operation and Development (OECD) assessment of 15-year-olds' academic preparedness. Top performers are defined as those students who scored in the top two proficiency levels (Level 5 and Level 6) on the math and science portions of the test. Comparable examinations are used wherever possible to place cities not included in the OECD assessment.

Natural disaster risk

Risk of natural disasters occurring in or near a city. Counted hazards include hurricanes, droughts, earthquakes, floods, landslides, and volcanic eruptions.

Number of Global 500 headquarters

Number of Global 500 headquarters located in each city, as per the CNN Money Fortune Global 500 list.

Number of international association meetings

Number of international association meetings per city per year that take place on a regular basis and rotate among a minimum of three countries. Figures provided by members of the International Congress and Convention Association.

Operational risk climate*

Quantitative assessment of the risks to business profitability in each of the countries. Assessment accounts for present conditions and expectations for the coming two years. The operational risk model considers 10 separate risk criteria: security, political stability, government effectiveness, legal and regulatory environment, macroeconomic risks, foreign trade and payment issues, labor markets, financial risks, tax policy, and standard of local infrastructure. The model uses 66 variables, of which about one-third are quantitative. Data produced by Economist Intelligence Unit's Risk Briefing.

Percent of population with higher education

Number of people who have completed at least a university-level education divided by the total population. A university-level education is set equivalent to a bachelor's degree or higher from a US undergraduate institution.

Political environment

Measure of a nation's relationship with foreign countries, internal stability, law enforcement, limitations on personal freedom, and media censorship. Data are from the Mercer Quality of Living reports.

Productivity

Productivity is calculated by dividing the gross domestic product (GDP) in 2012 US dollars by employment in the city. Data provided by Oxford Economics.

Public park space

Proportion of a city's land area designated as public recreational and green spaces to the total land area. Excludes undeveloped rugged terrain or wilderness that is either not easily accessible or not conducive to use as public open space.

Public transport systems

Measure of the efficiency, reliability, and safety of public transport networks to residents and visitors in each city. The extensiveness and integration of the systems are also factors. Cities are further differentiated by the extent of multi-modal transport systems, including subway, bus/bus rapid transit, taxi, light rail, tram/trolley/streetcar, commuter rail, and bike share systems.

Quality of living

Score based on more than 30 factors across five categories: sociopolitical stability, healthcare, culture and natural environment, education, and infrastructure. Each city receives a rating of either acceptable, tolerable, uncomfortable, undesirable, or intolerable for each variable. For qualitative indicators, ratings are awarded based on the Economist Intelligence Unit analysts' and in-city contributors' judgments. For quantitative indicators, ratings are calculated based on cities' relative performances on a number of external data-points. Data produced by the Economist Intelligence Unit Liveability ranking.

Rate of real GDP growth

2010-2011 gross domestic product (GDP) percentage growth rate in real terms expressed in 2012 US dollars. Data provided by Oxford Economics.

Recycled waste

Percentage of municipal solid waste diverted from the waste stream to be recycled.

Research performance of top universities

Sum of the scores of each city's universities included in the world ranking of top-performing research universities. Scaled scores are

based on the number of articles published, number of citations to published work, and the quantity of highly cited papers. The scoring accounts for social sciences papers but not humanities papers. The rankings favor large universities, universities with medical schools, and universities that focus predominantly on the "hard sciences" rather than social sciences and humanities. The performance ranking is carried out by the Higher Education Evaluation & Accreditation Council of Taiwan.

Resolving insolvency**

Gauges the weaknesses in existing bankruptcy law and the main procedural and administrative bottlenecks in the bankruptcy process by looking at three category areas: time and cost required to resolve bankruptcies and the recovery rate of the claim from the insolvent firm. Assessment scores sourced from Doing Business 2012, The World Bank Group.

Software development and multi-media design

Combined score for each city from fDi Benchmark's "Software Development Centre" and "Multi-Media Design Centres" profiles. Both indices gauge a city's performance based on the quality (weighted 70 percent) and the cost (weighted 30 percent) of the location as well as 120 quality competitiveness measures. For software development, these measures include availability and track record in ICT, availability of specialized-skills professionals such as scientists and engineers, access to venture capital, R&D capabilities, software exports, quality of ICT infrastructure, and specialization in software development. For multi-media design, measures include the size of the location's leisure and entertainment sector, its specialization and track record, information technology infrastructure, quality of life, and skills availability.

Thermal comfort

Measure of the average deviation from optimal room temperature (72 degrees Fahrenheit) in a city. January and July heat indices were calculated for each city using an online tool that integrates average temperature and aver-

age morning relative humidity during each month. A final thermal comfort score was derived by first taking the difference between a city's heat index for each month and optimal room temperature and then averaging the absolute values of these differences.

Total tax rate

Measure of the total taxes and mandatory contributions payable by the business in the second year of operation, expressed as a share of commercial profits. The total tax rate is designed to provide a comprehensive measure of the cost of all taxes a business bears. The World Bank Group, Doing Business 2012 reports the total tax rate for calendar year 2010.

Traffic congestion

Measure of traffic congestion and congestion policies for each city scored on the level of congestion, as well as the modernity, reliability, and efficiency of public transport.

Workforce management risk

Ranking based on staffing risk in each city associated with recruitment, employment, restructuring, retirement, and retrenchment. Risk was assessed based on 25 factors grouped into five indicator areas: demographic risks associated with labor supply, the economy, and the society; risks related to governmental policies that help or hinder the management of people; education risk factors associated with finding qualified professionals in a given city; talent development risk factors related to the quality and availability of recruiting and training resources; and risks associated with employment practices. A lower score indicates a lower degree of overall staffing risk. Rank scores sourced from the 2011 People Risk Index produced by Aon Consulting.

Working age population

Ratio of a city's population aged 15-64 to the total population of the city.

*Country-level data.

**Data based on countries' most populous city.

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By printing at a facility utilizing 100% wind energy and using postconsumer recycled fiber in lieu of virgin fiber:



13 trees were preserved for the future



39 lbs of waterborne waste were not created



5,687 gallons of wastewater flow were saved



629 lbs of solid waste were not generated



1,239 lbs net of greenhouse gases were prevented



9,482,515 BTUs of energy were not consumed