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Urbanization as Opportunity

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Some 10,000 years ago, humans started reorganizing their social and physical worlds, beginning what Shlomo Angel (2012) calls the urbanization project. Like any project, it reflects human intention. Building dense settlements was something we decided to do. Like any project, it also has a beginning and an end. An almost incomprehensible amount of work remains; nevertheless, the end is near.

Urbanization deserves urgent attention from policy makers, academics, entrepreneurs, and social reformers of all stripes. Nothing else will create as many opportunities for social and economic progress. And though it is hard to comprehend how much work remains, comprehending how quickly the work is now being done is even harder. The unique opportunities created by rapid growth in the urban population will soon pass, but it takes some explicit calculations to appreciate the urgency.

Human history suggests that we have a lot of time. The urbanization project began roughly 1,000 years after the transition from the Pleistocene to the milder and more stable Holocene interglacial.[1] As the climate began to favor sedentary agriculture, humans started building dense settlements. It took until 2010 for the urban share of the world's population to reach 50 percent (3.5 billion people).

Looking forward, the global population is likely to stabilize at more than 10 billion. The limiting value of the urban population is likely to exceed 8.5 billion. If it took 100 centuries to get to 3.5 billion urban residents, is it not safe to assume that it will take many centuries to make room for another 5 billion?

Actually, no. The urban population is increasing by roughly 60 million people a year, and that figure will soon likely reach 70 million. Even allowing for the inevitable reduction in the growth of urban population, a reasonable estimate suggests that we will add 5 billion new urban residents in just a single century.

It is not just today's incredible growth that challenges the imagination; it is also the rapid slowdown that is soon to follow. In our lifetimes, we will build urban accommodation faster than ever before. We will also have to prepare for a stable urban population and fewer options for spurring progress.

The urbanization project is already close to complete in developed countries. The remaining urban growth will play out almost entirely in developing countries. In 2010, the urban population in developing countries stood at 2.5 billion. In 100 years, this figure could be nearly three times larger. Moreover, as Angel (2012) shows, the historical pattern of urban growth suggests that urban density in developing cities could easily fall by half.

The developing world can accommodate the urban population growth and declining urban density in many ways. One is to have a threefold increase in the average population of its existing cities and a sixfold increase in their average built-out area. Another, which would leave

the built-out area of existing cities unchanged, would be to develop 625 new cities of 10 million people—500 new cities to accommodate the net increase in the urban population and another 125 to accommodate the 1.25 billion people who would have to leave existing cities as average density falls by half. These bracketing extremes, and all the intermediate alternatives they suggest, have strikingly different implications for the size distribution of cities and the possibilities for social innovation and reform.

We know that a city can expand its built-up area dramatically and successfully. During the 19th century, the built-up area of Manhattan expanded sevenfold along a street grid established in 1811.[2]

We also know that new cities can grow dramatically and successfully. Shenzhen, China, has grown from a tiny fishing village in 1980 to a metropolis of more than 10 million today. In just 30 years, the city's GDP has grown by a factor of roughly 1,000.[3] Because it was a new city that started with new rules, Shenzhen pioneered a new model of technological inflow, employment, and exports driven by foreign direct investment. After Shenzhen's success, the model spread across the country.

The most important citywide projects—successes like New York and Shenzhen—show even more clearly how influential human intention can be. In each case, a few people looked decades ahead and made a plan. No invisible hand guided Manhattan toward rectangular blocks of private property embedded in a public grid of avenues and streets. A real hand did—that of John Randel Jr., the engineer hired by a state commission to survey the island.[4]

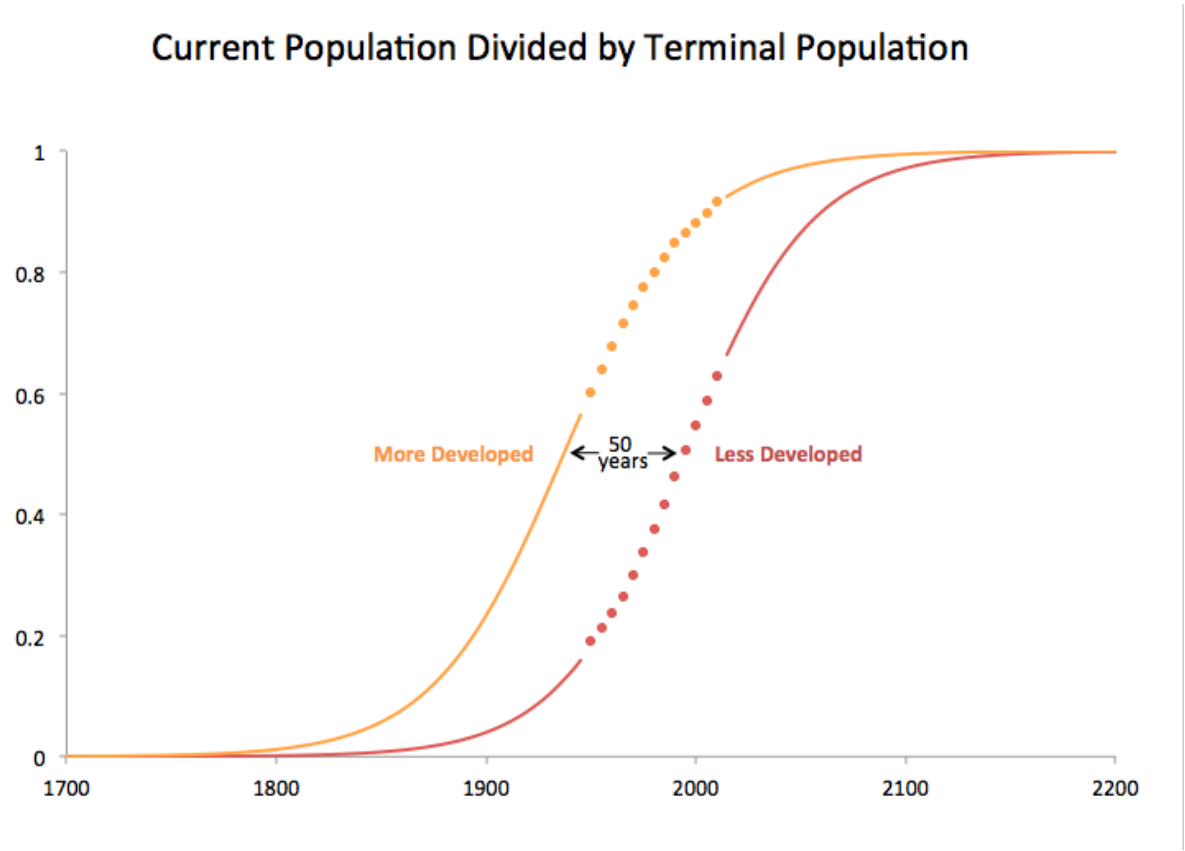
Nor did an invisible hand bring foreign firms into China. Deng Xiaoping carried out a clear plan for reform designed to make it socially acceptable for workers raised on Mao's Little Red Book to be hired by "foreign running dog capitalists." The representatives of official multilateral agencies that brought the Washington Consensus to China still criticize his deviation from their orthodoxy. They were certain that reform would succeed only if implemented uniformly across the national economy. But when many people want to move to new cities, it is possible to experiment and test such firmly held beliefs.

In creating an entirely new city, Deng's strategy was to harness the power of the same dynamic seen when start-ups drive an industry's adoption of new technologies. Of the four initial special economic zones in China, Shenzhen was the only big success. This is better than the 1-in-10 success rate venture capitalists claim for their start-ups. The low success rate for start-ups does not mean that we should stop encouraging them and aim only for across-the-board improvement at all incumbent firms. As Deng showed with his famous southern tour through the high-tech factories of Shenzhen, one very visible success was all it took to sustain the momentum of reform after the reactionaries counterattacked and the future of the market reform process hung in the balance.[5]

We live in a time when many people can plan for urban expansion as big and bold as the commissioners' plan for Manhattan in 1811 or for new cities as influential as Shenzhen. Hundreds of cities could expand as New York did or emerge out of nowhere as Shenzhen did. But the window of opportunity will not stay open forever. In 100 years, the urbanization project will be mostly complete.

Because cities are so durable, the choices we make through intention or inattention will have lasting consequences. Many future generations will live in the system of cities we leave for them in 2110.

Figure 1. Observed and projected normalized population for more developed and less developed regions, 1700–2200



Source: Authors' calculations based on UNDESA (2011).

The next 100 years

To estimate how long it will take to complete the urbanization project, it makes no sense to extrapolate an exponential trend that cannot possibly persist. To estimate the dynamics of growth in the face of an upper bound, the logistic is a natural alternative.

Recall that a variable x follows a logistic when it is constrained to lie between 0 and 1 and grows at the rate $g * (1 - x)$. If two curves have similar unconstrained growth rates g, it is simple to calculate the number of years by which one lags behind the other.

The United Nations (UN) publishes data on the total population and the urban population for 1950–2010.[6] It also groups the data into two broad aggregates: more developed regions (MDRs) and less developed regions (LDRs). For population, figure 1 shows the observed data points as dots and the fitted logistic curves as solid lines. The observation for a given year is the population in each region as a fraction of the terminal population for that region. The data do not pin down the terminal population with any precision. We assumed a terminal population of 1.35 billion for MDRs and 9 billion for LDRs, roughly in line with the medium fertility variant of the UN's world population projections to 2100.

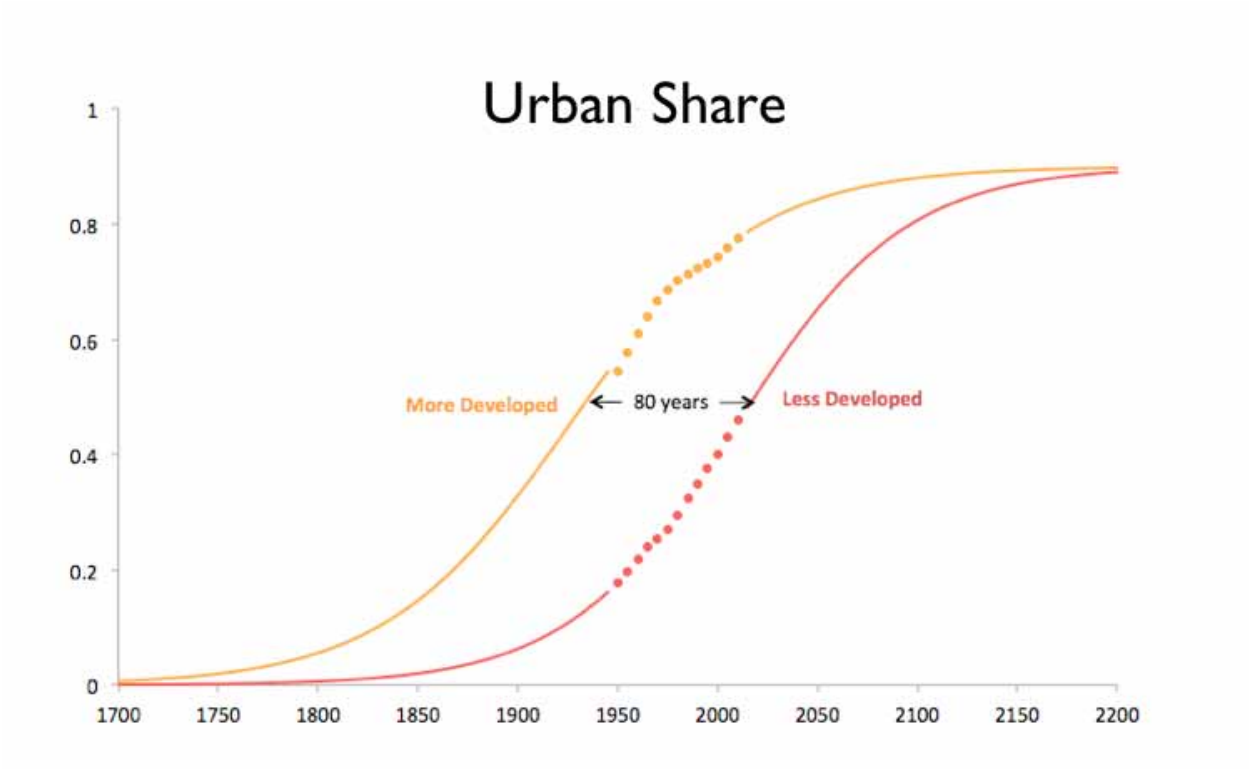
The goal here is not to test any hypotheses but merely to generate a natural set of summary statistics. Appearances notwithstanding, there is nothing especially impressive about the fit of these logistic curves. Many functional forms for distributions, including the standard normal, could yield an equally good visual fit. The advantage of the logistic is that its three key parameters—the terminal population, the initial rate of growth, and the lag between two curves—are easier to interpret.

The unconstrained growth rates for the two fitted curves in figure 1 are fairly close: 3.4 percent a year for the LDRs and 3.2 percent for the MDRs. This means that the 50-year lag between the two curves remains roughly constant over the last century and the coming one. The lag is consistent with other more granular data on health and demographics. For example, today's life expectancy in low- and middle-income countries that correspond to the LDRs is about the same as that in 1960 in high-income countries that correspond to the MDRs.[7]

Figure 2 shows the logistic fit for the urban share of the population in each region. In this case, we imposed a terminal urban share of 90 percent for both regions. This is on the high end of familiar estimates, but many projections of urban population look ahead only a few decades. Moreover, 90 percent is a value already seen in a few rich countries, notably Japan. Imposing a high terminal urban share lets us construct a useful upper benchmark for the scale of change that could be coming. It also lets us abstract away the concern that in many countries, actual governance might keep the potential urban share below the value justified by economic fundamentals. In this exercise, we are more interested in what the urban share could be than in what it is likely to be. At this aggregate level, the departures relative to more detailed country-by-country forecasting exercises are small. For 2050, the last year for which the UN provides projections, our simple procedure suggests a slightly higher share for the LDRs (65.3 percent) than does the UN projection (64.1 percent).

With our assumption about the terminal value, both logistic curves in figure 2 approach 0.9. Once again, the implied unconstrained growth rate, g, of the urban share is similar in the two regions: 2.3 percent a year in the LDRs and 2.1 percent in the MDRs. The curve for the urban share in the LDRs lags farther behind the MDRs (80 years) than does the growth curve for total population (50 years).

Figure 2. Observed and projected urban share of the population in more developed and less developed regions, 1700–2200

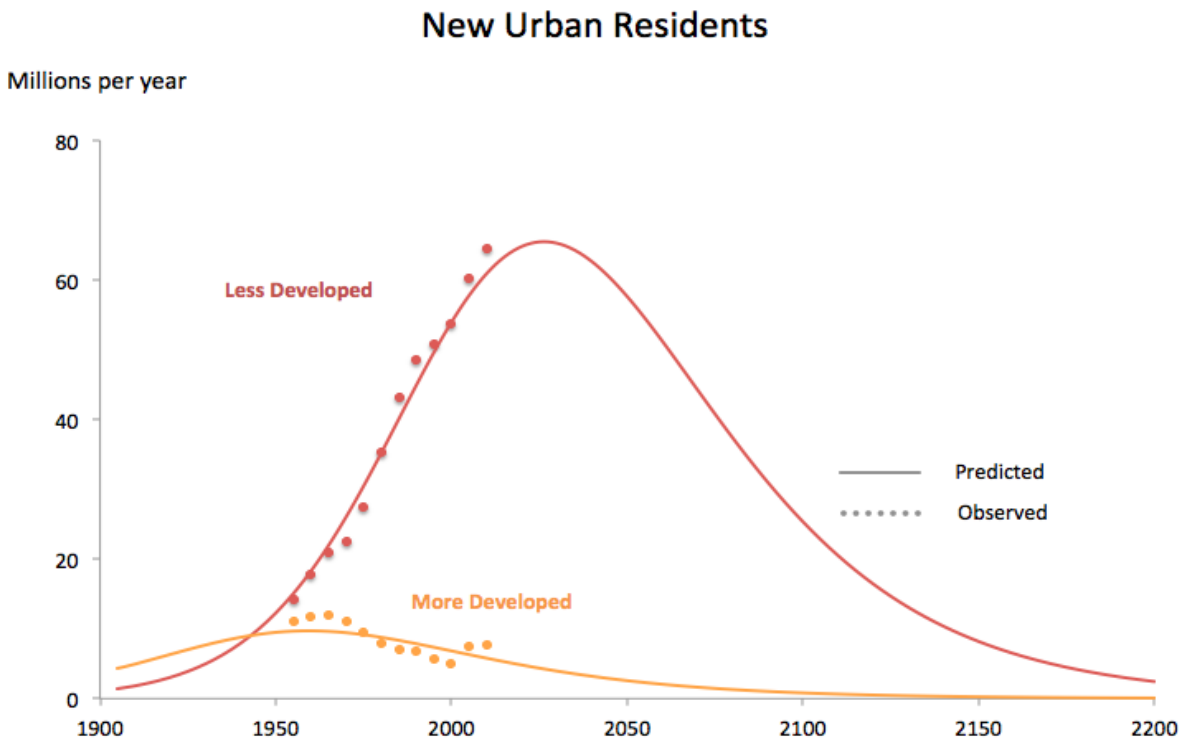


Source: Authors' calculations based on UNDESA (2011, 2012).

From these estimates, we can calculate the total urban population in each region as well as its annual increase. Figure 3 plots the annual increase in millions of new urban residents a year. If figures 1 and 2 are like plots of a fitted probability distribution function, figure 3 is like a plot of an implied probability density function. As always, the deviations from the fitted curve are much easier to see using densities. Note that the data points for 2000–05 and 2005–10 show increases in the number of urban residents larger than the fitted model predicts. For our purposes, underestimating the recent rate of increase is not problematic; it leads to an understatement of our general point. If our estimates of future growth rates are too low, the urbanization project will end even sooner than our calculations suggest.

The number of urban residents cannot continue to grow for long. The number of new urban residents in the LDRs must soon peak and begin to fall. We are already well past the peak in the MDRs. By putting the two curves on a single axis, figure 3 also shows the extent to which the remaining process of urbanization is overwhelmingly a phenomenon of the LDRs.

Figure 3. Observed and projected number of new urban residents in more developed and less developed regions, 1700–2200



Source: Authors' calculations based on UNDESA (2011, 2012).

Table 1 calculates the cumulative area under the curves for three time points defined relative to the milestone year of 2010: 1910, 2110, and 2210. In each reference year, the table shows the urban population and total population for each region. In the 100 years leading up to 2010, the total worldwide urban population increased 3.3 billion people. In the next 100 years, the projected increase is 5 billion. In the 22nd century, the projected increase is a mere 700,000. For the MDRs, the urbanization project is nearly complete; for the LDRs, there is only one century left.

Table 1. Urban residents and population, 1910, 2010, 2110, and 2210 (billions)

	Urban residents			Population
Year	Less developed	More developed	World	World
1910	0.04	0.15	0.19	0.9
2010	2.5	1.0	3.5	6.9
2110	7.3	1.2	8.5	10.1
2210	8.0	1.2	9.2	10.3

Source: Authors' calculations based on UNDESA (2011, 2012).

Interpreting the lags

If development were a one-factor process, we would expect the lag between the LDRs and the MDRs to be the same for population, life expectancy, and urbanization. Instead, we see that the lag for urbanization is longer than the lag for demographic variables.

In a very rough sense, Angus Maddison's (2012) data give us a simple way to examine the lags in income per capita. To approximate the UN definition of the MDRs with the Maddison data, we created an aggregate consisting of Western Europe, Western offshoots, and Japan. In 1870, GDP per capita in our MDR aggregate was about $1,900 (measured in Maddison's unit, 1990 International Geary-Khamis dollars). In the rest of the world, which corresponds roughly to the LDRs, GDP per capita did not reach $1,900 until 1970—a lag of 100 years. In 1900, GDP per capita in the MDR aggregate was $2,950. The LDR aggregate reached this level in 1995—a lag of 95 years. So, GDP per capita lags even farther behind the demographic measures than does urbanization.

One natural explanation for the lag and its variance across social indicators is differences in government capacity. Development in the LDRs today differs from development in the MDRs at comparable incomes per capita. The LDRs today can use technologies that already exist. Growth there is catch-up growth rather than growth at the technological frontier. All else equal, one would therefore expect that, at any income, LDRs would grow faster and the lags would simply disappear. However, if the LDRs have less government capacity to provide services that complement technologies from the MDRs, some gaps will persist.

In addition, government services might be strong complements to the private activities that generated rapid GDP growth through technological inflows in Shenzhen. But they might also be weak complements to the private activities that sustain rapid growth in the urban population. People can still urbanize, albeit less efficiently, in slums and *favelas* if few government services are available. When it comes to the spread of health technologies that lengthen lives and reduce fertility, government services might be much less relevant.

At the same income per capita, the LDRs will have more access to technology but fewer government services than did the MDRs during their phase of peak urbanization. The LDRs' GDP will lag farthest behind, their urban share will lag less, and their demographic indicators will lag the least.

Peak urbanization, weak capacity

Urbanization is peaking where the capacity to govern is in short supply. Despite all the lip service to capacity building, the standard internal processes that can improve government capacity might be unable to respond in a timely fashion. A quip attributed to Gordon Brown suggests how far off the time scales might be: "In establishing the rule of law, the first five centuries are always the hardest."

If governance is the scarce factor, we should be at once searching for ways to let more people move to places with good governance[8] and searching for ways to export government services from where they are plentiful to where they are scarce. The potential gains from either strategy are much larger than those from further reducing trade barriers to flows of privately provided goods and services.[9]

This suggests why building new cities, in addition to expanding existing ones, might be so important. Letting new cities enter a system of existing cities may be the best way to encourage the development of government capacity. New cities can facilitate the faster accumulation of local capacity (as in Shenzhen) or the faster diffusion of good governance through exporting government services (as in Hong Kong SAR, China).

Yet even with many new cities and with government services traded internationally, severe capacity constraints will force the rapidly urbanizing developing countries to prioritize. Governments will have to be narrow in the sense of not trying to do too many things but strong in the sense of doing those few things well.

For most rapidly urbanizing cities, Manhattan's 1811 plan is a good starting point for a feasible model of strong but narrow urban planning. The plan was narrow in that it did not designate densities, land uses, or locations for specific types of cultural, social, and economic development—tasks that even high-capacity governments have trouble getting right. It was also narrow in that it built the streets on a just-in-time basis. The plan was strong in that the government used eminent domain to take, from the beginning, the land that would eventually be needed for the streets. It forced land owners to cover the costs of road construction adjacent to their properties. It was also strong in that land designated for streets was protected for decades from squatting and informal settlement.

As Angel (2008) points out, governments in rapidly urbanizing areas today have the capacity to do what Manhattan did. Governments can focus first on setting aside the public space for parklands and an arterial grid of dirt roads. Angel refers explicitly to "dirt roads" to emphasize that public space can be taken and protected without the high spending necessary for building out the infrastructure. The eventual spending can occur as the city expands and new residents begin to demand services. Establishing the arterial grid, manageable for many capacity-constrained governments, is critical for coordinating market-driven urban development.

A strong but narrow approach to planning could help avoid placing any constraints on what private developers do inside a superblock defined by the arterial grid. As long as there is some diversity in the private developers working on superblocks, bad development practices in any one block need not limit the city's overall development. As land becomes more valuable, the mistakes in the superblocks will eventually be torn down and redeveloped. For this reason, getting the grid right will likely be more important than enforcing building codes on structures or imposing limits on density or the uses of superblocks.

A development goal for this century

Humans have done something that no other species has done. We have shifted from one type of social structure—mobile bands of a few dozen members to a few hundred—to a radically different one based on stationary nests of a complexity and scale that not even the social insects can match. More striking still, these nests have developed into a system of hubs linked by high-volume transit spokes. We are developing an integrated social system in which more than 10 billion people, spread across the globe, will cooperate. Cities are both locations that facilitate local cooperation and nodes that channel the flows of goods and people that facilitate global cooperation.

Humans have made progress not just because individuals keep discovering new technologies but also because each individual can take advantage of new technologies discovered anywhere by any other individual. This potential for discovering new nonrival goods explains technological progress. It also explains why there are gains from including everyone in our cooperative networks.

But it takes a set of social rules to structure the interactions of dense city life, not to mention the intercity mobility of goods and people. Ideally, these rules will be reasonably efficient now and in the future and capable of evolving with advances in our social and technological environment. In a small town, "go on green" is an efficient rule for managing traffic in an intersection. As the population in the town increases, "go on green" can be very inefficient. It must be supplemented with a new rule, "don't block the box."

In this broad dynamic of new technologies and ever denser and broader interactions structured by sets of rules, the rules hold us back. Rules that may once have been efficient can become inefficient even as they remain frighteningly persistent.

As an unprecedented amount of urban area is now being built out, and will continue to be in the next century, we have two main ways to establish cities that can work reasonably well. First, whenever possible, people should delineate the public space of the logistics network and utility corridors before the surrounding private space is occupied. Because the social rules for converting valuable private land into public space are so inefficient, it pays to do things right from the start.

Second, developing countries can make use of new cities. New cities can help with the much more subtle challenge of finding rules that strike the right balance between protecting the interests of the community and allowing individual freedom. New cities can compete for residents, allowing countries to use new political entities to try different types of rules, subjecting them to a market test of opt-in that can operate alongside the more familiar test of voice. Used wisely, the urbanization about to take place could create an even greater opportunity for people to choose how they want to live. In so doing, these entities will create more competitive pressures for jurisdictions to enact rules that will appeal to current and potential residents.

Perhaps if we use this opportunity to the fullest, the world could break free from the admission of failure implicit in the Millennium Development Goals—from the sad belief that the only hope for the world's poor is to shame governments into taking steps toward efficiency that the existing systems based on voice do not encourage. Perhaps we could replace it with a single goal: every family can choose from several cities that compete to attract them as permanent residents.

Notes

[1] Richerson, Boyd, and Bettinger 2001.
[2] Angel 2012.
[3] Zeng 2010.
[4] Ballon 2012.
[5] Zhao 1993
[6] UNDESA 2011, 2012.
[7] World Bank 2012.
[8] Clemens, Montenegro, and Pritchett 2008.
[9] Clemens 2011.

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