

# The World Is Spiky

*Globalization has changed the economic playing field, but hasn't leveled it*

## A POPULATION

*Urban areas house half of all the world's people, and continue to grow in both rich and poor countries.*

The world, according to the title of the *New York Times* columnist Thomas Friedman's book, is flat. Thanks to advances in technology, the global playing field has been leveled, the prizes are there for the taking, and everyone's a player—no matter where on the surface of the earth he or she may reside. "In a flat world," Friedman writes, "you can innovate without having to emigrate."

Friedman is not alone in this belief: for the better part of the past century economists have been writing about the leveling effects of technology. From the invention of the telephone, the automobile, and the airplane to the rise of the personal computer and the Internet, technological progress has steadily eroded the economic importance of geographic place—or so the argument goes.

But in partnership with colleagues at George Mason University and the geographer Tim Gulden, of the Center for International and Security Studies, at the University of Maryland, I've begun to chart a very different economic topography. By almost any measure the international economic landscape is not at all flat. On the contrary, our world is amazingly "spiky." In terms of both sheer economic horsepower and cutting-edge innovation,

surprisingly few regions truly matter in today's global economy. What's more, the tallest peaks—the cities and regions that drive the world economy—are growing ever higher, while the valleys mostly languish.

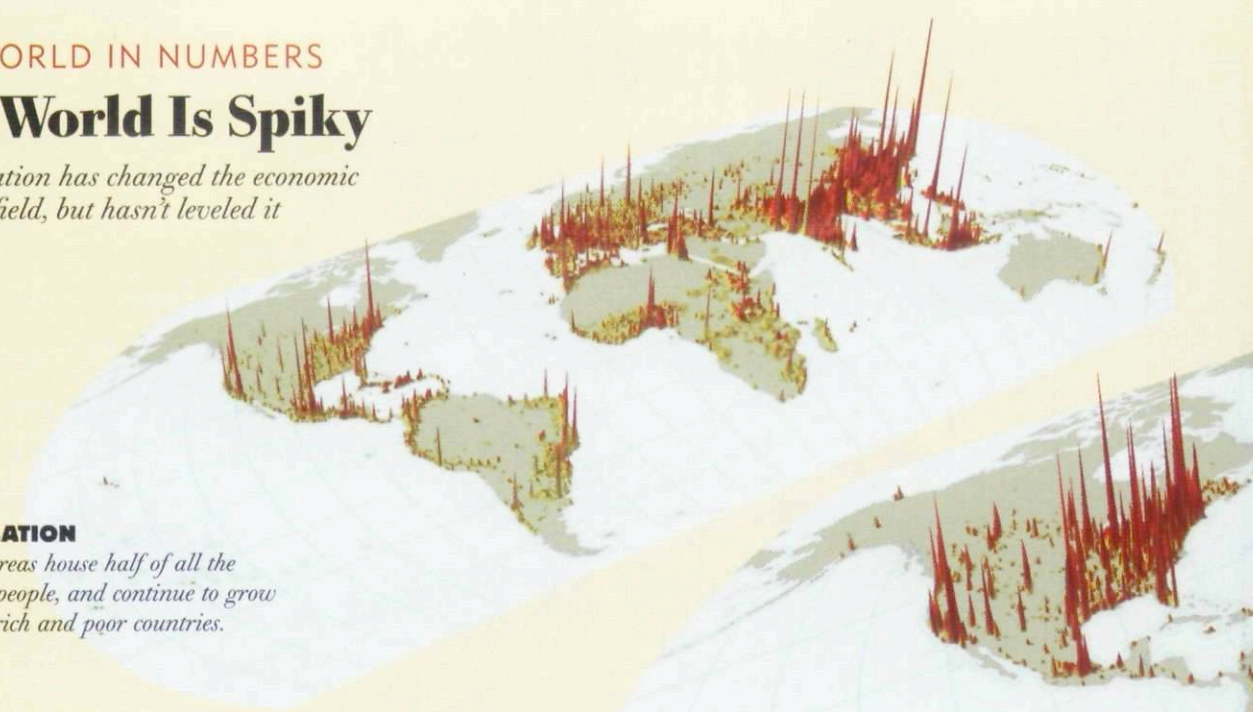
The most obvious challenge to the flat-world hypothesis is the explosive growth of cities worldwide. More and more people are clustering in urban areas—the world's demographic mountain ranges, so to speak. The share of the world's population living in urban areas, just three percent in 1800, was nearly 30 percent by 1950. Today it stands at about 50 percent; in advanced countries three out of four people live in urban areas. Map A shows the uneven distribution

of the world's population. Five megacities currently have more than 20 million inhabitants each. Twenty-four cities have more than 10 million inhabitants, sixty more than 5 million, and 150 more than 2.5 million. Population density is of course a crude indicator of human and economic activity. But it does suggest that at least some of the tectonic forces of economics are concentrating people and resources, and pushing up some places more than others.

Still, differences in population density vastly understate the spikiness of the global economy; the continuing dominance of the world's most productive urban areas is astounding. When it comes to actual economic output, the ten largest U.S. metropolitan areas combined are behind only the United

## PEAKS, HILLS, AND VALLEYS

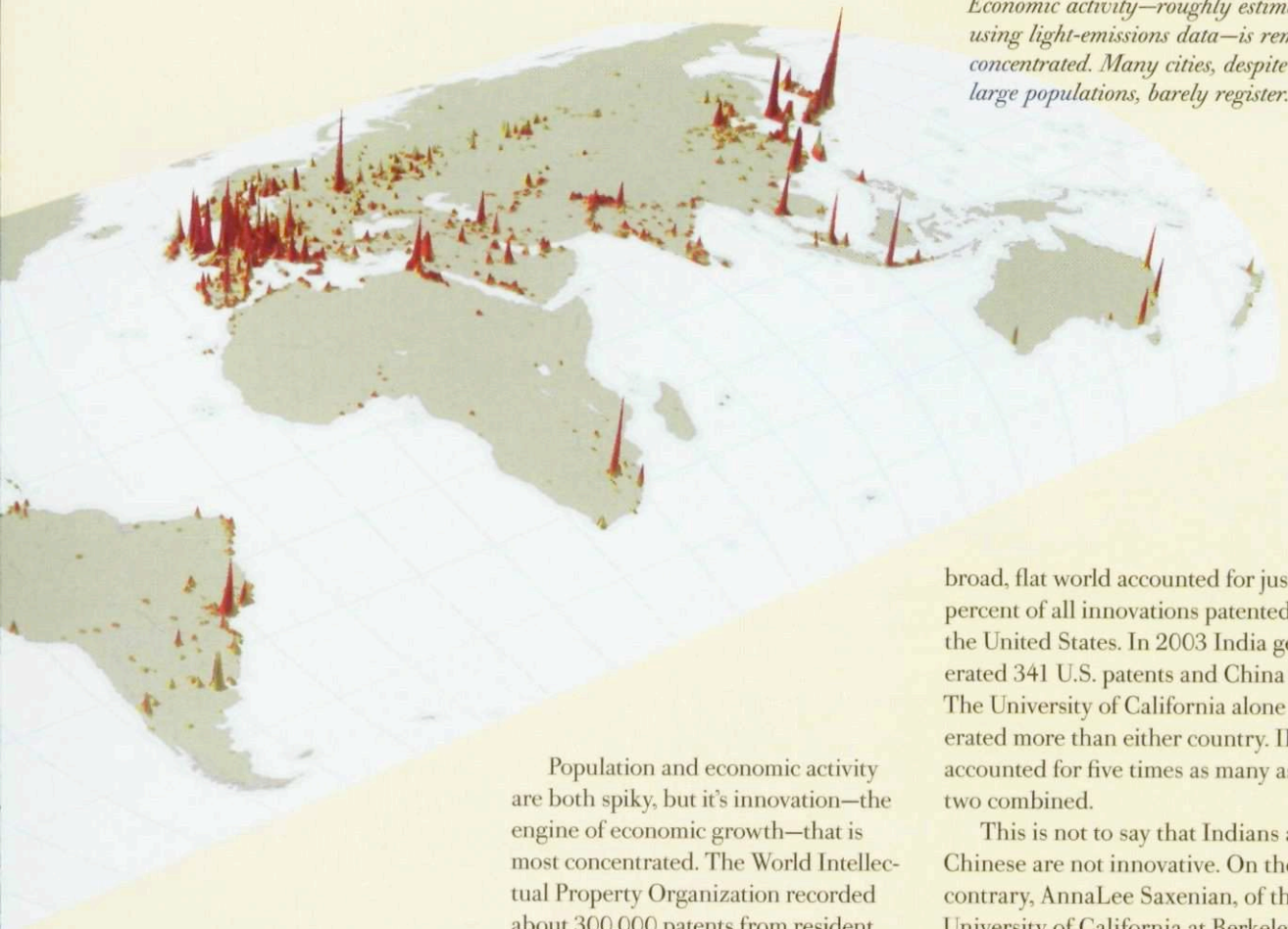
When looked at through the lens of economic production, many cities with large populations are diminished and some nearly vanish. Three sorts of places make up the modern economic landscape. First are the cities that generate innovations. These are the tallest peaks; they have the capacity to attract global talent and create new products and industries. They are few in number, and difficult to topple. Second are the economic "hills"—places that manufacture the world's established goods, take its calls, and support its innovation engines. These hills can rise and fall quickly; they are prosperous but insecure. Some, like Dublin and Seoul, are growing into innovative, wealthy peaks; others are declining, eroded by high labor costs and a lack of enduring competitive advantage. Finally there are the vast valleys—places with little connection to the global economy and few immediate prospects.





## B LIGHT EMISSIONS

*Economic activity—roughly estimated here using light-emissions data—is remarkably concentrated. Many cities, despite their large populations, barely register.*



States as a whole and Japan. New York's economy alone is about the size of Russia's or Brazil's, and Chicago's is on a par with Sweden's. Together New York, Los Angeles, Chicago, and Boston have a bigger economy than all of China. If U.S. metropolitan areas were countries, they'd make up forty-seven of the biggest 100 economies in the world.

Unfortunately, no single, comprehensive information source exists for the economic production of all the world's cities. A rough proxy is available, though. Map B shows a variation on the widely circulated view of the world at night, with higher concentrations of light—indicating higher energy use and, presumably, stronger economic production—appearing in greater relief. U.S. regions appear almost Himalayan on this map. From their summits one might look out on a smaller mountain range stretching across Europe, some isolated peaks in Asia, and a few scattered hills throughout the rest of the world.

Population and economic activity are both spiky, but it's innovation—the engine of economic growth—that is most concentrated. The World Intellectual Property Organization recorded about 300,000 patents from resident inventors in more than a hundred nations in 2002 (the most recent year for which statistics are available). Nearly two thirds of them went to American and Japanese inventors. Eighty-five percent went to the residents of just five countries (Japan, the United States, South Korea, Germany, and Russia).

Worldwide patent statistics can be somewhat misleading, since different countries follow different standards for granting patents. But patents granted in the United States—which receives patent applications for nearly all major innovations worldwide, and holds them to the same strict standards—tell a similar story. Nearly 90,000 of the 170,000 patents granted in the United States in 2002 went to Americans. Some 35,000 went to Japanese inventors, and 11,000 to Germans. The next ten most innovative countries—including the usual suspects in Europe plus Taiwan, South Korea, Israel, and Canada—produced roughly 25,000 more. The rest of the

broad, flat world accounted for just five percent of all innovations patented in the United States. In 2003 India generated 341 U.S. patents and China 297. The University of California alone generated more than either country. IBM accounted for five times as many as the two combined.

This is not to say that Indians and Chinese are not innovative. On the contrary, AnnaLee Saxenian, of the University of California at Berkeley, has shown that Indian and Chinese entrepreneurs founded or co-founded roughly 30 percent of all Silicon Valley startups in the late 1990s. But these fundamentally creative people had to travel to Silicon Valley and be absorbed into its innovative ecosystem before their ideas became economically viable. Such ecosystems matter, and there aren't many of them.

Map C—which makes use of data from both the World Intellectual Property Organization and the U.S. Patent and Trademark Office—shows a world composed of innovation peaks and valleys. Tokyo, Seoul, New York, and San Francisco remain the front-runners in the patenting competition. Boston, Seattle, Austin, Toronto, Vancouver, Berlin, Stockholm, Helsinki, London, Osaka, Taipei, and Sydney also stand out.

Map D shows the residence of the 1,200 most heavily cited scientists in leading fields. Scientific advance is even more concentrated than patent



## C PATENTS

*Just a few places produce most of the world's innovations. Innovation remains difficult without a critical mass of financiers, entrepreneurs, and scientists, often nourished by world-class universities and flexible corporations.*

### THE GEOGRAPHY OF INNOVATION

Commercial innovation and scientific advance are both highly concentrated—but not always in the same places. Several cities in East Asia—particularly in Japan—are home to prolific business innovation but still depend disproportionately on scientific breakthroughs made elsewhere. Likewise, some cities excel in scientific research but not in commercial adaptation. The few places that do both well are very strongly positioned in the global economy. These regions have little to fear, and much to gain, from continuing globalization.

production. Most occurs not just in a handful of countries but in a handful of cities—primarily in the United States and Europe. Chinese and Indian cities do not even register. As far as global innovation is concerned, perhaps a few dozen places worldwide really compete at the cutting edge.

Concentrations of creative and talented people are particularly important for innovation, according to the Nobel Prize-winning economist Robert Lucas. Ideas flow more freely, are honed more sharply, and can be put into practice more quickly when large numbers of innovators, implementers, and financial backers are in constant contact with one another, both in and out of the office. Creative people cluster not simply because they like to be around one another or they prefer cosmopolitan centers with lots of amenities, though both those things count. They and their companies also cluster because of the powerful pro-

ductivity advantages, economies of scale, and knowledge spillovers such density brings.

So although one might not *have* to emigrate to innovate, it certainly appears that innovation, economic growth, and prosperity occur in those places that attract a critical mass of top creative talent. Because globalization has increased the returns to innovation, by allowing innovative products and services to quickly reach consumers worldwide, it has strengthened the lure that innovation centers hold for our planet's best and brightest, reinforcing the spikiness of wealth and economic production.

The main difference between now and even a couple of decades ago is not that the world has become flatter but that the world's peaks have become slightly more dispersed—and that the world's hills, the industrial and service centers that produce mature products and support innovation centers, have proliferated and shifted. For the

better part of the twentieth century the United States claimed the lion's share of the global economy's innovation peaks, leaving a few outposts in Europe and Japan. But America has since lost some of those peaks, as such industrial-age powerhouses as Pittsburgh, St. Louis, and Cleveland have eroded. At the same time, a number of regions in Europe, Scandinavia, Canada, and the Pacific Rim have moved up.

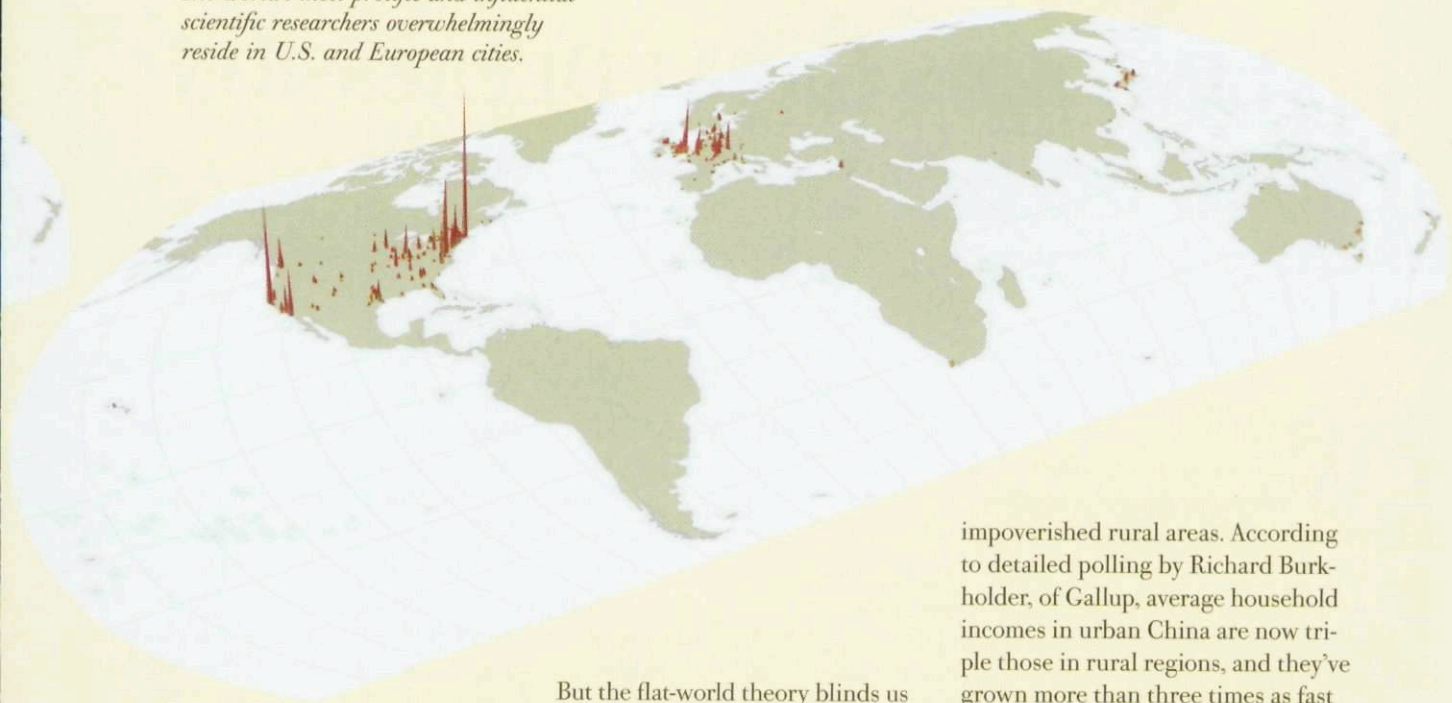
The world today looks flat to some because the economic and social distances between peaks worldwide have gotten smaller. Connection between peaks has been strengthened by the easy mobility of the global creative class—about 150 million people worldwide. They participate in a global technology system and a global labor market that allow them to migrate freely among the world's leading cities. In a Brookings Institution study the demographer Robert Lang and the world-cities expert Peter Taylor identify a relatively small group of leading city-regions—London, New York, Paris, Tokyo, Hong Kong, Singapore, Chicago, Los Angeles, and San Francisco among them—that are strongly connected to one another.

But Lang and Taylor also identify a much larger group of city-regions that are far more locally oriented. People in spiky places are often more connected



## D SCIENTIFIC CITATIONS

*The world's most prolific and influential scientific researchers overwhelmingly reside in U.S. and European cities.*



to one another, even from half a world away, than they are to people and places in their veritable back yards.

The flat-world theory is not completely misguided. It is a welcome supplement to the widely accepted view (illustrated by the Live 8 concerts and Bono's forays into Africa, by the writings of Jeffrey Sachs and the UN Millennium project) that the growing divide between rich and poor countries is the fundamental feature of the world economy. Friedman's theory more accurately depicts a developing world with capabilities that translate into economic development. In his view, for example, the emerging economies of India and China combine cost advantages, high-tech skills, and entrepreneurial energy, enabling those countries to compete effectively for industries and jobs. The tensions set in motion as the playing field is leveled affect mainly the advanced countries, which see not only manufacturing work but also higher-end jobs, in fields such as software development and financial services, increasingly threatened by offshoring.

But the flat-world theory blinds us to far more insidious tensions among the world's growing peaks, sinking valleys, and shifting hills. The innovative, talent-attracting "have" regions seem increasingly remote from the talent-exporting "have-not" regions. Second-tier cities, from Detroit and Wolfsburg to Nagoya and Mexico City, are entering an escalating and potentially devastating competition for jobs, talent, and investment. And inequality is growing across the world and within countries.

This is far more harrowing than the flat world Friedman describes, and a good deal more treacherous than the old rich-poor divide. We see its effects in the political backlash against globalization in the advanced world. The recent rejection of the EU constitution by the French, for example, resulted in large part from high rates of "no" votes in suburban and rural quarters, which understandably fear globalization and integration.

But spiky globalization also wreaks havoc on poorer places. China is seeing enormous concentrations of talent and innovation in centers such as Shanghai, Shenzhen, and Beijing, all of which are a world apart from its vast,

impoverished rural areas. According to detailed polling by Richard Burkholder, of Gallup, average household incomes in urban China are now triple those in rural regions, and they've grown more than three times as fast since 1999; perhaps as a result, urban and rural Chinese now have very different, often conflicting political and lifestyle values. India is growing even more divided, as Bangalore, Hyderabad, and parts of New Delhi and Bombay pull away from the rest of that enormous country, creating destabilizing political tensions. Economic and demographic forces are sorting people around the world into geographically clustered "tribes" so different (and often mutually antagonistic) as to create a somewhat Hobbesian vision.

We are thus confronted with a difficult predicament. Economic progress requires that the peaks grow stronger and taller. But such growth will exacerbate economic and social disparities, fomenting political reactions that could threaten further innovation and economic progress. Managing the disparities between peaks and valleys worldwide—raising the valleys without shearing off the peaks—will be among the top political challenges of the coming decades. —RICHARD FLORIDA

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