

antigovernment stances amount to an abandonment of U.S. corporations and high-growth entrepreneurs in their fight for global market share and U.S. jobs. We should want American establishments and entrepreneurs to win this fight. We should want American establishments to have the best workforce, science, and technology transfer systems in the world. We should want American establishments to benefit from competitive tax and regulatory systems. We should want other nations to pay for U.S. exports and not steal them or force American companies to sell at lower than market prices. We should want U.S. companies to be able to innovate around technology platforms that government helps support. We should want them to have access to the best and the brightest from around the world. And we should want them to be able to access foreign markets, but in nations that are playing by the rules.

### Conclusion

Innovation is in some ways quite simple: organizing societal resources (research, finances, knowledge, skills, and entrepreneurial effort) to generate new products, processes, and business models. And the way societies can support innovation is to erect as few roadblocks as possible and devote the resources needed to make it easy to improve the status quo. Recognizing the need for innovation is central. As we have seen, all of this is easier said than done. The next chapter assesses nations' and regions' prospects for overcoming these barriers to innovation.

## Can Nations Overcome the Barriers to Innovation?

There is no doubt that winning at innovation involves hard work, although a measure of luck doesn't hurt. Just ask Mark Zuckerberg, who happened to get Facebook to market and gain a critical mass of users faster than the social network's competitors. But at the end of the day, if the result of any individual effort to innovate involves a set of odds, the chances of success escalate if the individual takes the right steps. Societies are no different. If nations are organized so that individuals and organizations have the right incentives to innovate, the resources needed to innovate, and access to the customers who want innovation, then the odds increase significantly that they will be an innovation leader.

### Balancing the Yin and Yang of Innovation

As we have seen, national innovation success requires not only putting in place the right policies to support innovation, but also reducing the barriers to innovation. Both depend on finding the right balance between three key sets of potentially competing factors: (1) individual versus collective

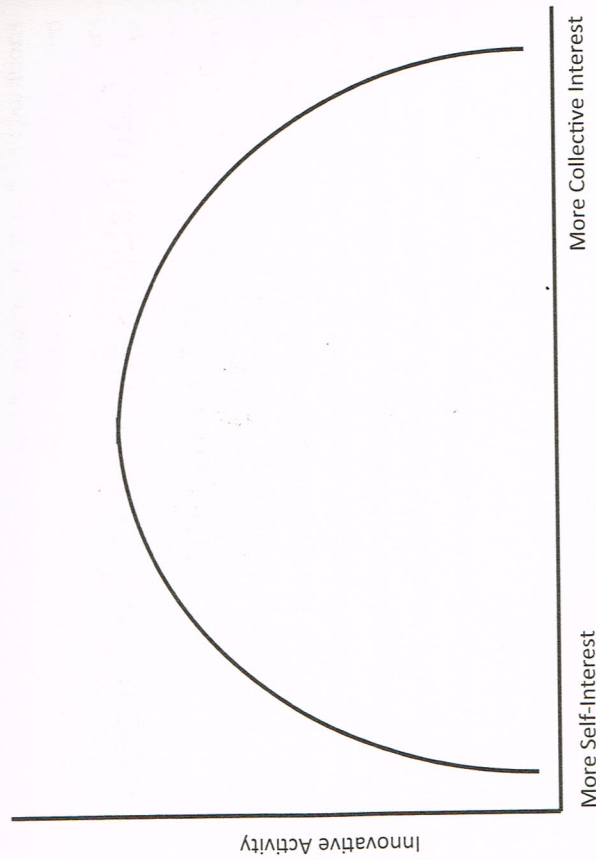


Figure 10.1 The Inverted "U" Curve for Innovation

interests, (2) current versus future generation interests, and (3) stability versus dynamism. Nations poised to do well in the race for global innovation advantage likely will be those that find the right balance between these competing interests. Such nations will have found a balance at the top of the inverted "U" curve between the two poles of these three factors (figure 10.1). Being too far in one direction will likely mean suboptimal innovation performance.

#### *Enabling Individual Freedom versus Providing Collective Support*

All societies balance an inherent tension between the public and the private good, and between individual freedom and collective responsibility. Throughout history, different societies have placed their emphasis at different points on the continuum, as have different political philosophers, from Hobbes (individual) to Marx (collective). Where to establish this balance is a key question that nations must address. Investment analyst Vinny Catalano writes: "What is the right balance? What serves the greater good:

acting in one's own self-interest even to the seeming detriment of the greater good or deferring one's self-interested benefits at potentially great individual expense (for the moment or longer) and thereby allowing others to gain?"<sup>1</sup> We postulate here that the nations effectively balancing the tension between individualism (emphasis on individual rights and freedom) and communitarianism (emphasis on the collective good) better position themselves to win the innovation race.

If there is too much communitarian focus and public intervention, individuals (and firms) lack the freedom and incentives to innovate. Likewise, if nations are too top-down in their efforts to innovate, they risk not only picking the wrong technologies, but limiting innovations that would emerge from entrepreneurs acting in response to market signals. By definition, innovation is about challenging the status quo, identifying unmet market opportunities, and swiftly and effectively bringing new solutions to the marketplace. No matter how "reinvented" government is, it can never do this job solely or even principally on its own. As we learned from the seventy-five-year experiment with Communism, societies that focus principally on the collective interest at the expense of the individual cannot build an innovation economy or society. As conservatives are rightly fond of pointing out, centrally directed economies that limit individual incentive cannot be innovative.

But to go from that statement to the other extreme and claim that only unfettered free markets are best for a country to succeed at innovation is equally misguided. Societies that minimize the importance of the collective, societal interest will also underperform with regard to innovation, not to the same degree as centrally directed economies, but certainly in relation to economies that find a more appropriate balance. While innovation is undoubtedly about entrepreneurs bringing new value to the marketplace, in many cases, it's not just some lone, creative entrepreneur seeing beyond where others can. Innovation more often than not involves collective action. When Sir Isaac Newton famously stated "I stand on the shoulders of giants," he meant that the advancement of knowledge requires building on what others have done before, as Steven Johnson explains in *Where Good Ideas Come From: The Natural History of Innovation*.<sup>2</sup> But innovation not only requires building on the work that others have done

before, it usually requires coordinating with others' current work. In this sense, entrepreneurs acting on their own will not produce all the innovation that is possible. Indeed, a wide array of new economic research suggests that markets acting alone will underperform in producing innovation. As chapter 5 discusses, because of these market failures around innovation, unless society actively supports innovation, entrepreneurs will underproduce it.

Thus, the critical issue in the dynamic relationship between the individual and the community should not be framed—as it is by many economists, pundits, and policymakers—as the state *versus* the market. Instead, as *The Origin of Wealth* author Eric Beinhocker writes, the issue should be framed as “how to combine states and markets to create an effective evolutionary system.”<sup>3</sup> How to craft this effective evolutionary system (Beinhocker's term for an innovation system) in the most effective way is a practical problem that should not be guided by broad sweeping ideological statements such as “government always gets it wrong” or “government should direct innovation.”

One way to assess where nations stand on the continuum between the market and the state is the World Values Survey (WVS). The most recent WVS asks individuals in fifty-four countries their views on a wide range of issues, one of which is whether government ownership or private ownership of business should be increased.<sup>4</sup> While government ownership of business is not usually the way to maximize innovation, the question is a useful indicator of where nations stand on the continuum of individual versus collective. It is important to keep in mind that individuals' answers to the question may reflect existing levels of ownership: people in nations with higher levels of government ownership might actually want less. Notwithstanding this, the survey finds significant differences between nations.

It is perhaps not surprising that the United States ranks highest in thinking that government ownership of business should decrease, with a weighted net score of 54 for less ownership (58 for less ownership minus 4 for more ownership).<sup>5</sup> Commonwealth nations also favored less government ownership, with New Zealand, Canada, and Australia scoring 41, 35, and 18, respectively. Continental European nations varied. Spain and Germany, which scored 2 and 11, respectively, were only slightly more in favor

of more private ownership. In contrast, individuals in Sweden (20), Finland (23), and Switzerland (24) were more strongly in favor of private ownership, but nowhere near as strongly as Americans.

Again, perhaps not surprisingly, Asian nations favor more, not less, government ownership. China had one of the highest negative scores (-38), reflecting a strong desire for even more government control of the economy than it already has. Citizens in Indonesia (-20), Malaysia (-5), Thailand (-21), and India (-7) also wanted more government control. Surprisingly, Vietnam was positive (14), but this may reflect dissatisfaction with the already high levels of government ownership there. Given the general trust in government in Asian nations, it is surprising that Japanese citizens also wanted less government, scoring in the same range (22) as Commonwealth and Nordic nations. Reflecting its long tradition of socialist thought and dictatorial governments, Latin America had very high negative scores, with Argentina scoring the highest of any nation in the survey (-56), and Chile (-30), Colombia (-29), and Mexico (-5) all favoring more government ownership.

While it is overly simplistic to say that the middle ground is the optimal place from which to drive innovation, these scores do reinforce the view that, compared to other nations, the United States is too far to the free-market side of the continuum to win in the innovation economy. In the United States, government and market are usually seen as antithetical forces, with a society only able to choose one; kind of like the old beer commercial: “Tastes Great! No, Less Filling!” And our public discourse is usually about the dangers of tilting too far toward the collective side of the continuum. Indeed, Adam Smith's widely quoted statement that the individual who “intends only his own gain” will, in the course of maximizing his needs, be “led by an invisible hand to promote . . . the public interest” is touted as Talmudic-like proof that there is no trade-off and that the right place is on the individual side of the continuum.<sup>6</sup> It's worth noting that devotees of Smith are asking policymakers in today's global, knowledge- and technology-based economy to base their actions on the works of someone who wrote well over two centuries ago about a preindustrial economy. Physicists don't refer back to the sacred texts of Sir Isaac Newton. Doctors don't base their treatment decisions on the writings of Dr. Charles Mayo.

Yet many U.S. economists and economic policymakers repeatedly quote an eighteenth-century tract, making the case for innovation policy a tougher one than in nations that are more balanced.

But if the United States is too extreme on the side of individual freedom and markets, other nations, most notably China, are just as extreme on the side of collective interest and state control. The Chinese government still exerts a strong role over the economy, with many enterprises still state owned and others significantly guided by the very visible hand of government. The idea that markets and entrepreneurs should be in the lead in determining the course of innovation is as foreign to China as the idea that government should be in the lead is to the United States. Absent a shift toward the individual side of the continuum, it will be difficult for nations like China to develop truly entrepreneurial economies.

#### *Balancing the Interests of the Current and Next Generations*

To maximize innovation, nations must also find the right balance between the interests of present and future generations. A nation focused only on the present generation would not invest in the future. Why pay higher taxes to support government investments in research, education, and infrastructure when the benefits accrue to future generations? But in even the most present-oriented society, people agree as part of the social contract to sacrifice at least some benefit now for greater gains in the future.

Conversely, a nation focused only on future generations would invest too much of its wealth for the future good and spend too little on current consumption. But while it's clearly a problem if nations invest too little in innovation, can nations invest too much? They can if they reduce current consumption so much that it dampens opportunities for innovation to meet consumer needs or if the future investments become big, expensive boondoggles. Innovators need a market for their goods and services, and if current consumption is limited too much, the market for innovators is artificially limited.

We only have to look at the United States and China to see this yin and yang of future versus current consumption. America's challenge is that because it has become overly focused on individual consumption today, it

significantly underinvests for the future. China's problem is the opposite; it's impoverishing its current generation to prepare for the future, in some times wasteful ways that also retard present-day innovation.

One only has to look at policies toward currency and trade balances. America's strong dollar policy is designed to maximize present consumption. With the U.S. dollar stronger than the economy's underlying capabilities allow—as signified by accrued trade deficits running into the trillions of dollars—America's 310 million consumers can buy their imported DVD players, T-shirts, and cars cheaply, but the production base that would produce wealth in the future is hollowed out. While some of the effects of a weaker manufacturing and technology base are felt already by the 5.5 million manufacturing workers who have lost their jobs from 2000 to 2011, they will be most keenly felt in the future in the form of relatively lower U.S. productivity and a trade debt that future generations are on the hook to pay off by producing more than they consume and exporting the difference.

The U.S. trade debt is like any other debt—it will have to be paid back.<sup>7</sup> China, Germany, Saudi Arabia, and other nations running big trade surpluses with the United States are not just giving us DVD players, luxury automobiles, and oil. They want something in return. And while they are willing to accept pieces of paper (U.S. Treasury bills, or T-bills) now, those bills are only worth something when they are traded for real goods and services. And at some point, these nations will demand this, forcing future generations of Americans to pay off the current generation's trade debt. It's as simple as this: every DVD player, luxury automobile, and barrel of oil that Americans consume now by expanding our trade debt is a DVD player, luxury automobile, and barrel of oil that a future generation will be responsible for paying for in the form of reduced consumption of real goods and services.

If the U.S. political economy leads to a focus on maximizing current consumption, China's focus is on minimizing consumption. In part because of its culture of caring about future generations, and in part because China is ruled by an authoritarian government that can impose austerity with little fear of public backlash, Chinese policy limits citizens' after-tax income and uses the surplus to maximize future investment. The primary way China does this is by undervaluing its currency. As noted, the \$426

billion current account surplus China accumulated in 2008 did not boost the living standards of present-day Chinese citizens; all that value was transferred outside China's borders. If China balanced its trade and purchased more foreign products instead of foreign T-bills, the average Chinese household would see a 17 percent increase in disposable income, as represented by the increased imports they could enjoy. So why is Chinese economic policy designed to impoverish its current generation by running huge trade surpluses (instead of importing more)? Because it hopes to gain global industrial market share that could benefit future workers—and because China's Communist leaders believe that it is only by expanding exports that it will create enough jobs to perpetuate the regime's political stability.

We see this tension between present and future consumption not just in currency policy, but in many other areas, including infrastructure policy. Infrastructure—the basic facilities, services, and installations needed for the functioning of a society—entails tangible physical infrastructure such as bridges, roads, rails, airports, pipelines, water systems, electrical networks, and energy storage facilities. It also entails digital infrastructure such as smart electric grids, fixed and mobile broadband communications networks, digital databases, and standards. For at least three decades after World War II (WWII), the United States led the world with the most advanced physical infrastructure and made large and sustained investments year after year. Yet today, near gridlock on many roads in large metropolitan areas, crowded airports, collapsing bridges, and electric grid failures are all a consequence of America's unwillingness to invest for the future. In fact, the United States ranks just twenty-third out of 139 countries in the overall quality of its infrastructure.<sup>8</sup> In 2009, the American Society of Civil Engineers gave America's infrastructure an average grade of D. The society estimated the five-year investment need to restore crumbling infrastructure at \$2.2 trillion.<sup>9</sup>

The United States reaped the benefits of previous generations' foresight and investment, generations that developed and built a transportation system that became the envy of the world. But since the early 1980s, Americans have violated the pact by which current generations invest to make the future better than the present. An ever-expanding backlog of investment needs is the price of our failure to maintain funding levels. Revenues

raised by all levels of government for capital investment total only about one-third of the roughly \$200 billion necessary each year to maintain and improve the nation's highways and transit systems.<sup>10</sup> While Americans have expected to be served by high-quality infrastructure, they have been increasingly less willing to contribute the money needed not only to maintain the infrastructure but also to expand it to meet the needs of a growing population. As figure 10.2 shows, the average age of the government capital stock (which includes assets such as roads, bridges, and water systems) has increased by almost 50 percent since 1970 as the nation has failed to invest adequately to replace aging infrastructure.<sup>11</sup> It's interesting to note that the average age of nonresidential infrastructure (the buildings and machines used by the private sector) also grew during 2000–2010 by about one year, as U.S. companies cut back investment in favor of paying higher dividends to shareholders who demand their fair share now.

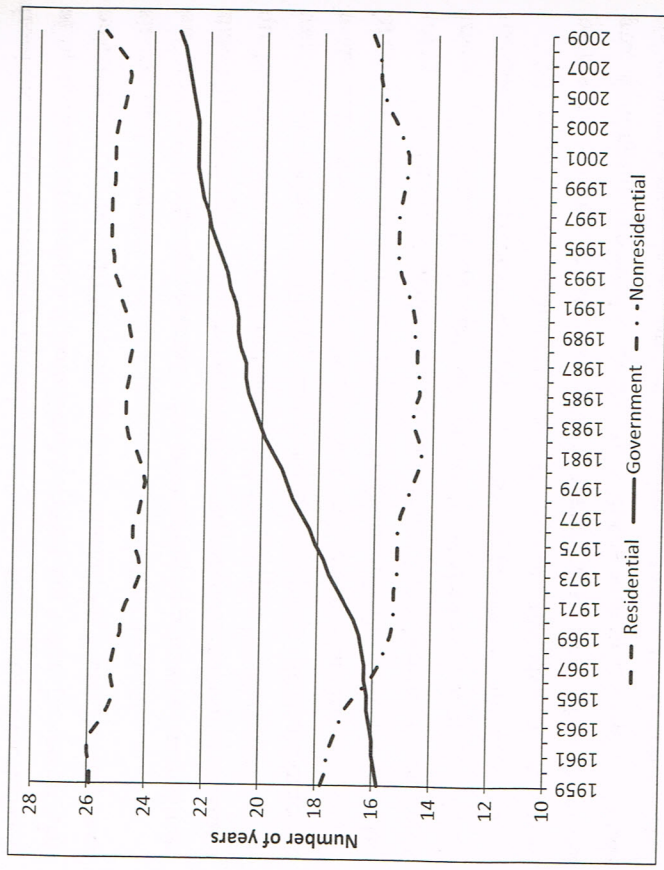


Figure 10.2 America's Aging Infrastructure: Average Age of Capital Stock  
Source: Based on statistics from the U.S. Bureau of Economic Analysis.

Compare this to China, which is enjoying an infrastructure boom, spending more than 15 percent of its gross domestic product (GDP) on domestic infrastructure projects.<sup>12</sup> In 2010 alone, China invested 682 billion yuan (about \$100 billion) in twenty-three major new projects. Between 2000 and 2009, China invested more than 2.2 trillion yuan (\$330 billion) in 120 major infrastructure projects.<sup>13</sup> For example, in transportation infrastructure, China plans to double the size of its high-speed rail network—already the largest in the world—by laying down more than twenty-six thousand miles of additional track by 2020.<sup>14</sup> For automobiles, it's building tens of thousands of miles of expressways and will surpass the United States in highway mileage in less than a decade.<sup>15</sup> From 1997 to 2009, China invested 4.3 trillion yuan (\$650 billion) in Internet infrastructure, constructing an optical communications network five million miles long and providing broadband access to 96 percent of Chinese towns.<sup>16</sup> China's investment also includes the most expensive infrastructure project in the world, the enormous South-North Water Transfer Project, which will divert fresh water from the Yangtze River to dry northern cities like Beijing at a projected cost of up to 420 billion yuan (\$60 billion)—more than twice the cost of China's recently completed Three Gorges Dam, the largest hydroelectric power station in the world.<sup>17</sup>

But where the United States is underinvesting in infrastructure, China may be investing too much too rapidly, and without enough attention to quality, as several recent derailments of its high-speed trains attest. Moreover, while China is building massive research parks, at least some are underutilized with quite low levels of occupancy. One such industrial park had room for a thousand companies, but had only forty-two tenants. For many of these investments, there is no serious consideration of return on investment, even though infrastructure investment only makes sense if the expected net present value returns exceed the cost of capital.

With regard to scientific research, we see the same dynamics. Investments in science can take as many as forty years to pay off, but on net provide very high societal rates of return. But as with infrastructure, while the costs are borne by the present generation, many of the benefits accrue to future generations who didn't pay for the research. From WWII until the 1970s, the United States led the world in investment in research. But now,

with 2.8 percent of GDP devoted to research and development (R&D), the United States ranks just eighth among countries tracked by the Organization for Economic Cooperation and Development (OECD) in R&D intensity, behind Israel, Finland, Sweden, Korea, Japan, Denmark, and Switzerland. Each of those countries has a R&D intensity greater than 3 percent, with Israel leading the way with an astounding R&D intensity of 4.3, followed by Finland and Sweden with exceptionally strong rates of 4.0 and 3.6 percent, respectively. Compared with these countries' commitment to investing in R&D, the United States is lagging considerably. As noted, the primary reason for this decline has been a decrease in federal funding. In the first decade of the 2000s, federal investment in R&D as a share of GDP was just 44 percent of levels in the 1960s (1.75 percent versus 0.77 percent). In fact, from 1987 to 2008, federal R&D investment grew at just 0.3 percent per year in constant dollars—much lower than its average annual growth of 4.9 percent from 1953 to 1987—and ten times lower than the rate of GDP growth over that period. Among thirty-six nations, the United States ranked only twenty-eighth in the growth of government investment in R&D from 1999 to 2009, with a growth rate seventeen percentage points below the average of the other nations.

What is especially troubling about these trends is that while Americans as a whole have gotten richer, they have also become more shortsighted and self-interested. In the 1960s, when R&D was 1.75 percent of GDP, this meant that Americans were willing to invest 2.8 percent of their income in government R&D. Today, with per capita incomes almost three times higher in real dollars, Americans are only willing to invest 0.48 percent of their income in government R&D (just 17 percent of the 1960s level). To see the extent of this shift to the present-day side of the continuum, consider that in the 1960s, the total of government investment in R&D, infrastructure, and education, plus the trade surplus (or deficit) minus the national debt, equaled 3.1 percent of GDP. In the 1970s, this figure fell to 0.8 percent, but was still positive. In the 1980s, it went negative, to -3.3 percent of GDP. In other words, we were cutting investments in the future while running up bills for the future. In the 1990s, with the decline in the trade and budget deficits, this composite figure improved slightly, to -1.3 percent. However, from 2000-2010, it plummeted to -4.5 percent of

GDP. In other words, from the 1960s to 2010, there has been a shift of 7.6 percentage points in the amount of investment for the future and future debt. And this doesn't include the estimated shortfall in state and local government public pensions of at least \$2.5 trillion.<sup>18</sup>

While the WWII generation ran up huge budget deficits to pay for the war effort, its members also largely paid off that debt, leaving their children a legacy of low debt, modern infrastructure, great research facilities, and trade and capital account surpluses, which the Baby Boomer generation then promptly squandered. Yet today, the Baby Boomer generation has done the opposite. Today, the Left rejects cutting entitlements—including to people ages sixty-five to seventy, most of whom could work—as a way to pay for needed investments and reduce future debt, while the Right rejects increasing taxes on individuals as a way to pay for needed investments. What do they have in common? A short-term individualistic orientation: “Me, now!” As James Lincoln Collier wrote in *The Rise of Selfishness in America*, “A nation in which most people cannot even occasionally put the good of the whole society above their own immediate gratification is bound to grow steadily worse.”<sup>19</sup>

If the United States is all about “Me, now,” China is about “Us, then.” Not only is China impoverishing its own current generation, it's impoverishing future generations of Americans through its huge trade surplus. China is investing hundreds of billions of dollars in the future—in research, infrastructure, and overall economic subsidies, including currency manipulation. And while some of this investment is surely efficient in the sense of providing a reasonably high social rate of return, some of it—and perhaps much of it—is inefficient and wasteful. Japan recycled its trade surpluses of the 1990s back into building physical infrastructure and proceeded to waste a significant share of it on “white elephant” projects. The Chinese are doing the same today, and, through forced societal savings, they are limiting domestic markets that could spur entrepreneurial growth.

#### *Balancing Employment Stability and Dynamism*

To maximize innovation, societies have to be able to accept what Schumpeter called “creative destruction”—the development of new kinds of orga-

nizations and technologies that often displace old ones. While all change involves risk, if a nation's residents view change as too risky, they are likely to resist change and press for stasis and stability. But conversely, dynamism can be too high in nations if employment security is too low. Take Japan and the United States as examples of this yin and yang.

In the 1980s, many who studied the Japanese economic miracle praised Japan for its system of lifetime employment, arguing that it gave workers the security they needed to accept the innovations their firms might make. In contrast, U.S. workers, who had less employment security and a very weak social safety net, were more likely to resist organizational innovations. Today, the problem for Japan and similar nations (including many in Europe) is that a system of security through employment gives companies little incentive to adopt innovations that boost productivity since there is almost no way to reduce head count. In Japan, at a 2011 Chief Technology Officer (CTO) forum on innovation at which Rob Atkinson spoke, the discussion turned to why Japanese enterprises invest so little in information technology (IT) (less than half the rate of U.S. enterprises). The CTO of a major Japanese electronics corporation explained: “Why invest in IT when if it successfully raises productivity you are limited in your ability to reduce head count?” Indeed, when Japanese companies do lay off workers to become more productive, they are often publicly castigated. In June 2010, Naoto Kan, Japan's prime minister, criticized Nissan CEO Carlos Ghosn for firing workers, even though Ghosn had rescued Nissan from bankruptcy. Much of the resistance to laying off Japanese employees stems from the fact that it can be quite difficult for them to get new jobs. And if they do get one, they usually suffer a loss in salary, seniority, and pension.

If entrepreneurial ventures were plentiful in Japan, that would be one thing. But disruptive entrepreneurial ventures that might displace existing organizations are viewed with suspicion in Japan. At the same forum, the moderator raised concerns about clean energy innovation because it might lead to job losses for Japanese oil refining and gas station workers. The conversation then turned to attitudes toward entrepreneurship. Atkinson mentioned that his nineteen-year-old son was studying computer science and hoped to be part of a successful IT start-up by the time he turned twenty-five, something his parents heartily endorsed. At best, their son

would be part of a successful company, and at worst he would learn valuable skills that he could take to his next company. In response, a Japanese executive fretted: "In Japan, most parents would be extremely worried if their son wanted to go down this path, for if the start-up failed, what would he do next? He would likely be unemployed or face a series of low-wage, dead-end jobs. Better that he go to work for a large, stable corporation." This, in a nutshell, explains why there is so little entrepreneurship in Japan. But it also explains why the Japanese government has worked to limit mergers and bankruptcies, since both usually result in firm restructuring and employment loss. This overriding focus on stability leads to a society where elevators in many stores are still operated by pretty young women, even though most countries phased out elevator operators decades ago. Yukio Hatoyama, leader of the ruling Democratic Party in Japan, bases his political philosophy on what he calls "fraternity," which means empathy toward workers, rather than a concern with corporate profits. But what about empathy toward Japanese consumers who are stuck with higher prices? Japan's quest for a "humane" and stable economy is a recipe for a low-growth economy.

Japan is by no means the only nation where employment security acts as a barrier to innovation. While it's easier for French employers to lay off workers, they pay a high price, usually having to pay tax-free redundancy benefits to employees and, even then, they are not off the hook. In France, when Molex, an electronics parts maker, closed a plant that had been unprofitable for years, it paid out \$42 million in redundancy payments, but affected employers sued the company demanding even more. When the company stopped payments in response, the French government's minister of industry publicly called the firm's behavior "scandalous" and ordered French car makers to stop doing business with the supplier.<sup>20</sup> In Argentina, states such as Santa Fe have even outright banned large grocery stores from laying off employees.<sup>21</sup>

If the Argentines, Japanese, and French resist change because their employment security is so strong, Americans resist it because their employment security is so weak. U.S. workers have few protections, and companies can and do engage in corporate restructuring that leads to layoffs. The upside is that companies can more easily reengineer work to boost produc-

tivity and to lower prices for consumers. The downside is that this makes it simple for companies to take the easy way out and move jobs offshore to cut costs rather than doing the hard work of automating labor domestically and investing in the skills of their workforce (leading to some layoffs, rather than an entire plant being shuttered). Another upside of the U.S. environment is that American workers are much more likely to start new companies, in part because if they fail, they can more easily get back in the workforce as compared to Japanese workers. But if American workers are "free agents" as compared to Japan's "organization men," they also are free agents working without a net. If U.S. workers lost their jobs, at least before the recent health-care reform legislation, they risked losing health insurance coverage (if they even had it through an employer), their home, and more. In most cases, the newly unemployed are eligible for only minimal short-term unemployment insurance benefits. For these reasons, many Americans have turned against globalization and innovation, seeing it as a threat to the fragile security they might have at work.

The key to success for nations is to combine flexibility for organizations to restructure and to innovate (including the ability to go out of business when entrepreneurial competitors come up with a better widget) with security for workers. But the security should not be tied to employment, as it is in Japan, but rather to employability. This describes a model that several Scandinavian nations have adopted called "flexicurity" (a combined term for "flexible security"). Flexicurity systems include:

- comprehensive lifelong learning strategies to ensure the continual adaptability and employability of workers;
- effective active labor market policies that help people cope with rapid change, reduce unemployment spells, and ease transitions to new jobs; and
- modern social security systems that provide adequate income support, encourage employment, and facilitate labor market mobility.<sup>22</sup>

Flexicurity is based on the reality that employment security is decreasing. To help workers manage, they will need new kinds of security—not to help them stay at a particular job, but to help them effectively transition into new employment through viable skills.



One model is Finland. It has created a flexicurity program that includes features such as requiring employers to give workers who are to be released paid time off during the notice period for the purpose of job seeking, giving employees a right to a reemployment program, and providing increased and more effective employment office services.<sup>23</sup> It also helps in Scandinavian nations that health insurance is not a function of employment; thus, if workers lose their jobs, they don't lose their health coverage. All of these factors are why a Swedish labor union leader stated: "Swedish unions don't fear new technology; we fear old technology." In other words, if the companies they work for don't continually modernize, they will risk losing all their jobs. So they are willing to risk having their companies restructure work through new technology because they know that loss of a particular job is not catastrophic.

### The Innovation Success Triangle

If national balance with respect to the three "yin and yang" factors is the key to success in the race for global innovation, there are a number of specific individual components that nations must also master. Indeed, national innovation success depends on a range of factors, and nations need to get most of these right to win the race. One way to understand these factors is to conceptualize an "Innovation Success Triangle," with business environment factors along one side, the regulatory environment along another, and the innovation policy environment along the third (figure 10.3). Success requires correctly structuring all three sides of the innovation triangle.

Factors comprising an effective business environment include the activities, institutions, and capabilities of a nation's business community. Innovation-friendly factors include: vibrant capital markets, but also ones that discourage short-term investing; a population that accepts and even embraces churn and change; high levels of entrepreneurship; a culture in which interorganizational cooperation and collaboration is accepted; high levels of university licensing and patenting; strong IT adoption, especially among business; strong executive management skills; and a business investment environment that strikes the right balance between short- and long-term goals.

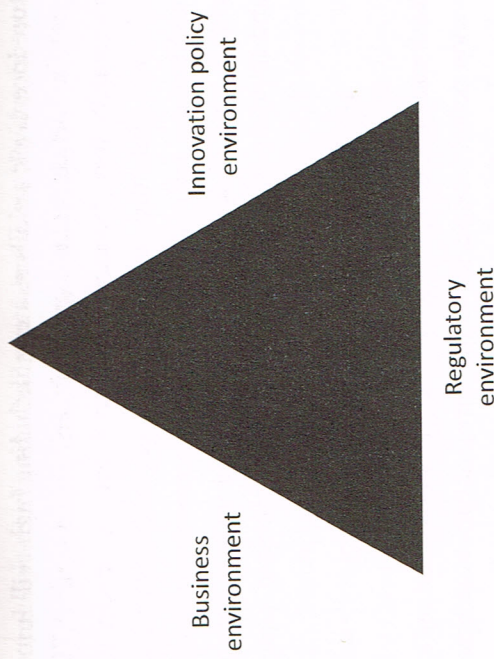


Figure 10.3 The Innovation Success Triangle

An effective regulatory environment features a competitive and open trade regime, including an aggressive stance by government to protect its businesses against foreign mercantilist attacks; processes by which it's easy to launch new businesses and to bring innovations to market; transparency and the rule of law; a reasonable business tax burden; robust and competitive product and labor markets; a strong patent system and protection of intellectual property; and limited regulations on the digital economy. To be sure, a good regulatory climate does not mean simply the absence of regulations. As we saw with the recent financial crisis, the right kinds of regulations are critical to ensuring that markets work and innovation flourishes. But nations need a regulatory climate that supports rather than blocks innovators and that creates the conditions to spur ever more innovation and market entry.

The final leg of the triangle is a strong innovation policy system. This includes generous support for public investments in innovation infrastructure (such as science, technology, tech transfer systems, and rural broadband and other digital infrastructures); channeling R&D into specific technology or industry research areas; funding sector-based industry-university-government research partnerships; reshaping the corporate tax code to spur innovation and IT investment, including R&D and capital

expenditure incentives; a skills strategy, including high-skill immigration and support for science, technology, engineering, and math (STEM) education; encouraging private-sector technology adoption, especially by small and mid-sized manufacturers; supporting regional industry technology clusters and regional technology-based economic development efforts; active policies to spur digital transformation in the private and nonprofit sectors; and championing innovation in the public sector.

### Innovation Prospects for the World

As nations compete to win the global innovation race and try to master the innovation policy triangle, some will sprint out ahead, others will remain stuck in the middle of the pack, and still others will struggle to get out of the starting gate. Nations and regions face different challenges in the race. No nation has it entirely right just yet, although a few come close. While some nations—such as Japan and much of Europe—have strong innovation policy systems, many of them suffer from limited regulatory and business environments. Others, like the United States, have reasonably good business and regulatory environments, but weak innovation policy environments. The nation that can put together all three sides of the triangle most effectively while managing the yin and yang of innovation is likely to be the nation that wins the race.

### *The United States: Boston or Buffalo?*

A century ago, two of the fastest growing, most dynamic metropolitan areas in America were Boston, Massachusetts, and Buffalo, New York. As historian Mark Goldman writes, “In 1901, the year Buffalo hosted the Pan American Exposition, the city was buoyant and rapidly expanding. With more than 350,000 people its population was growing rapidly while its economy was strong and diversified. Commerce, Buffalo’s traditional source of wealth, gave every sign of remaining prosperous. . . . Meanwhile, the development of heavy industry, particularly of steel, pointed to still more growth and greatness. Buffalo’s growth had already been remarkable and its future seemed filled with promise.”<sup>24</sup> But the greatness lapsed as

Buffalo’s economy declined. Goldman continues, “By the 1970s and early 1980s, all the high hopes that the people of Buffalo had once had for the city had been dashed.” By the mid-2000s Buffalo’s population was around 270,000, half of what it was at midcentury, and 80,000 less than a century before. Its once monumental steel mills are largely shuttered, and the economy now depends on a mix of service sectors, including higher education, regional banking, and government services.

In 1900, Boston looked like it faced similar prospects. It hosted thriving textile and shoe industries and had long been a commercial trading center. But by the Great Depression and especially after WWII, many of the textile and shoe firms fled the Boston region for cheaper labor in the South, just as many manufacturing firms have now decamped for cheaper wages in China. Boston looked like it was on the same path to decline as Buffalo. But as chapter 1 explains, Boston subsequently reinvented its economy on several occasions, notably after WWII and again in the 1980s, and today boasts a diverse innovation-based economy with thriving biotechnology, IT, and financial services sectors.

The history of the American economy shows that some places, partly through a combination of luck and location, but also grit, have been able to rebound from adversity and transform themselves as the overall economy transforms. But other places were not as adaptive and suffered as a result. The key question, therefore, is whether over the course of the next two decades the United States will be like Buffalo and sink further into relative decline or, like Boston, rise again from its decline through innovation and economic transformation.

There are certainly reasons to believe that the United States is on the Buffalo path. America has become a society obsessed with short-term gain, both in business and society at large, and does not seem to be able to summon the will to invest for the long term. Moreover, American society and politics have become much more concerned with protecting, preserving, and redistributing our previously accumulated wealth than with growing wealth anew. It has had significant difficulty summoning any kind of moderate, pro-market but also pro-government policies.<sup>25</sup> Our foreign policy is focused on military, not economic, issues. We have schizophrenic positions on immigration and attracting foreign talent. We have developed

a perverse egalitarianism and anti-elitism that bode ill, for it means that efforts to enable excellence—whether it's separate toll lanes or high schools for those gifted in math and science—are branded as antidemocratic and elitist. Finally, the federal balance sheet is deeply in the red with no more money available for investment in the future. America has spent it all and has refused to cut wasteful spending, especially the massive entitlements for retirees who are retiring earlier and living longer, or to raise taxes on individuals, with the result that there is nothing left to make the kinds of public investments in innovation the nation needs. In addition, the nation has a political economy culture that seeks to minimize the role of government in supporting companies' innovation efforts.

Yet notwithstanding this array of challenges, America is not necessarily destined to become Buffalo because, like Boston, it comes to the race with enduring strengths. It retains a creativity and risk-taking orientation that other nations and regions lack, particularly Asia. Its IT companies continue to be global leaders. It has a strong network of universities and national laboratories. And it's wealthy enough to make big bets on future investment should it choose to do so.

Returning to the innovation success triangle, the U.S. business environment—with the exception of a shortsighted investment focus on the part of U.S. businesses, no small deficit—is mostly strong. And while the regulatory environment weakened some in the 2000s, it generally supports private-sector innovation. The big challenge for the United States is its innovation policy environment, where the federal government underperforms in terms of what we call the four Ts (tax, trade, technology, and talent).

However, it's possible that there is an emerging awareness that the path America has been on is not sustainable. And should this awareness broaden, it could very well lead to action, just as the Japanese/German challenge to the United States of the late 1970s and early 1980s led to action. If Churchill was right when he said that you could count on the Americans to do the right thing once they've exhausted all the other options, Americans have to recognize that they have come close to exhausting all the other possibilities and need to begin to take bold action. And they will have to recognize that success in this new twenty-first-century race has to be won with help from all three sides of the triangle, including a much more coherent

and robust innovation policy side. To date, such recognition has not been apparent, although, in some pockets, it is growing.

### *Europe: Italy or Finland?*

For most of the postwar period, productivity grew faster in Europe than in the United States, partly as Europe caught up to the American lead established in the last quarter of the nineteenth century and the first half of the twentieth century. But after 1995, the trend reversed, with U.S. productivity growing faster, even after the European Commission stated its intention with the 2000 *Lisbon Strategy* to become the world's innovation leader by 2010. If the challenge for the United States is whether it will be Buffalo or Boston, the challenge for Europe is whether it will be Italy or the Nordics.

Italy was not always a study in economic decline. While the United Kingdom was losing its industrial advantage in the 1950s and 1960s, Italy was enjoying what many at the time called the Italian economic miracle—called in Italy, “il boom.” But since 2000, the boom became a bust, with one result being that “a fairly large amount of Italy's economic literature has recently focused on the country's stagnation.”<sup>26</sup> Italy's numerous small enterprises, which were once an advantage because of their flexibility, are now a disadvantage because they can't boost productivity enough to compete with firms in nations like China and they can't diversify fast enough into industries and technologies that low-wage nations have difficulty moving into. Marco Annunziata, the London-based chief economic analyst at Unicredit, stated: “The country has stagnated for at least the last ten years. We have an enormous public debt with no room for maneuvering in the budget. We have low productivity, and growth probably the lowest in Europe. And because of global competition, the system is only going to get worse.”<sup>27</sup> Italy is, in fact, one of the few old European nations that has a net outmigration of college graduates.<sup>28</sup>

Compare that with Nordic nations like Denmark, Finland, and Sweden, which have been able to stay competitive in global markets by boosting productivity and continuing to invest in R&D and education. Two decades ago, most pundits wrote off the Nordics, claiming that their social democratic model of high taxes, high social benefits, and worker security was

antithetical to innovation and growth. But unlike many European nations, the Nordics took action. They lowered their corporate tax rates and introduced investment incentives. For example, Sweden slashed its corporate tax rate from 52 percent in 1989 to 26.3 percent today.<sup>29</sup> The Nordic countries invested in innovation to a significant degree, through their universities and through specialized national innovation agencies. They developed national innovation strategies. Even the unions got in the game, with many of the private-sector unions understanding that employer innovation and adoption of new technologies were instrumental to their own future. And their citizens appear to have a much greater appreciation of the importance of innovation than Italian citizens.

It's important to note that there is considerable variability within Europe in how countries are doing on innovation, particularly by region and over time. Northern and Western European countries considerably outperform those in Southern and Eastern Europe, with Spain, Italy, Portugal, Slovenia, Slovakia, and Greece all in the bottom half of the Information Technology and Innovation Foundation's (ITIF's) *Atlantic Century II* assessment of the innovation capacity of forty-four countries and regions. At the same time, several of the larger European economies have demonstrated slow progress in improving their innovation capacity since 1999. Out of forty-four countries and regions, France ranks thirty-seventh, Germany thirty-eighth, and Italy forty-fourth in improving their innovation capacity during 1999–2011.<sup>30</sup> The Baltic nations have performed much better in this regard, with Estonia, Latvia, and Lithuania placing fifth, seventh, and twelfth, respectively.<sup>31</sup>

Assessing Europe through the Innovation Success Triangle yields mixed results. European businesses actually perform fairly strongly on innovation. In fact, the European Union's (EU's) *Sixth Community Innovation Survey* (CIS) found that 52 percent of EU-27 enterprises reported innovation activity between 2006 and 2008.<sup>32</sup> By comparison, the U.S. National Science Foundation's 2008 *Business R&D and Innovation Survey* (BRDIS), which covered the same period and asked the exact same questions as the CIS, found that just 9 percent of surveyed U.S. firms were active innovators from 2006 to 2008 (although about 22 percent of U.S. manufacturing companies reported innovation activity).<sup>33</sup> A 2004 OECD report prepared

by Eric Bartelsman found that the “rates of innovation” between U.S. and EU enterprises were actually the same, and that in contrast to popular belief Europe was not behind.<sup>34</sup> However, Bartelsman found that the United States did a much better job than Europe of more quickly allocating capital and labor to the most promising innovative concepts and start-up businesses, so the United States was spawning more “winners,” even though the underlying rates of innovation were analogous. This points to the weaknesses many European countries face with regard to bureaucratic regulatory environments that impede capital and labor movement and place unnecessary burdens on firm creation and dissolution. With a regulatory system that embraces the precautionary principle—which holds that if an action or a policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is *not* harmful falls on those taking the action—Europe's regulatory approach is actually biased against innovation and is clearly the weakest link in its innovation success triangle.

Yet it's not as if the countries in the European Union—not to mention the European Union itself—aren't trying to win the innovation race. In fact, at least they know they are in a race and need innovation policy to help them win. And, as we have seen, many European countries do have strong innovation policy environments, supported in many cases by national innovation foundations and cogently articulated national innovation strategies. Several Northern or Western European countries, including Denmark, Germany, Finland, France, the Netherlands, Sweden, and the United Kingdom, are clearly toward the front of the pack in terms of their innovation policy efforts.

However, if all it took was intention to win, Europe would be a lot farther ahead, for European policymakers have at least conceptually said many of the right things, as evidenced by proclamations such as Europe's *Lisbon Strategy*. While the *Lisbon Strategy* produced some benefits, it's generally regarded as having failed to meet its goals, and thus the European Union launched an updated *Europe 2020 Strategy* in June 2010 that set concrete goals for the EU and each of its member states around five core objectives—employment, innovation, education, social inclusion, and climate/energy—to be reached by 2020.<sup>35</sup> To be sure, such strategies are laudable and, in pock-

ets, European countries have made strides. But such strategies have yet to transform the continent into the world's clear innovation leader, in large part because Europe still has not realized that it cannot achieve an innovation economy without embracing at least a modest amount of Schumpeterian creative destruction while rejecting a smothering and unaffordable welfare state.

Regarding the first problem—the lack of full implementation—a challenge for Europe is that it is still a collection of different nations with different languages, laws, and regulations, which makes the emergence of continental-wide markets difficult to achieve, particularly in services sectors such as law, accounting, and medicine. The halting efforts to create a European patent system provide another example of the difficulty in developing an integrated European innovation ecosystem. And the fiscal crisis within Europe in 2011 and 2012 has shown how tenuous the entire European project is. Moreover, as an entity, the European Commission has not had the budgetary power to enact European-wide innovation policies, particularly science and technology (S&T) policies, at the right scale. To date, the continent has relied instead on underfunded national policies. However, recognizing these challenges, on November 30, 2011, the European Commission announced Horizon 2020, a new financial instrument for research and innovation funding for Europe that seeks to invest €80 billion (\$106 billion) from 2014–2020 in both scientific and technological-based innovation and also nontechnological and social innovation. Though the proposal awaits approval by the European Parliament, Horizon 2020 represents a significant financial commitment toward bolstering Europe's innovation competitiveness.

But as for the second challenge, as much as European leaders embrace innovation, they have a decidedly schizophrenic view of it. When they refer to innovation, they really mean science- and technology-based jobs, not innovation. This is because innovation is the constant transformation of an economy and its institutions, and one thing Europe does not want is constant transformation, especially if it has the potential to upset the delicate balance of their social democratic societies. Even though Schumpeter was a European, Europeans are not Schumpeterians. They want the benefits of a knowledge-based technology economy without the creative destruction

that not only accompanies it but also is required to achieve it. Some in Europe get this. For example, one of the goals of SITRA, the Finnish Innovation Fund, is to “promote systemic innovation in Finnish society.”<sup>36</sup> But the visionaries are working uphill to convince fellow Europeans. Paul Giacobbi, a member of the French Assembly, states: “The idea that nothing will change, no factory will ever close, and restructuring will not be a permanent feature is contrary to everything that the direction of the world tells us every day.”<sup>37</sup> Unless Europe can accept that innovation entails plant closures and job losses, new technologies with uncertain social or environmental impacts, and new kinds of business models and organizations, it's not likely that it will be able to keep up in the race for global innovation advantage.

#### *Southeast Asia: Export Mercantilists or Model of Balanced, Productivity-Led Growth?*

When looking at the more developed economies of Southeast Asia, including Japan, Singapore, Korea, and Taiwan, one must certainly be impressed with their ability to become technology leaders, particularly in high-tech manufacturing. China has developed into a manufacturing powerhouse and India seeks to be a leader in IT. Many of these nations have been able to maintain or even to grow manufacturing as a share of their economies. Japan, in fact, remains a leader in sectors like electronics and manufacturing, and is well positioned in emerging industries such as robotics and nanotech-based materials. Remember, it was General Motors (GM) and Chrysler that went bankrupt and had to be rescued by the government, not Toyota and Honda. In fact, as the *Economist* notes, Japanese firms hold more than 70 percent of world market share in thirty industries worth more than \$1 billion, including digital cameras and car navigation devices.<sup>38</sup> And Japan and Korea are extremely well positioned to lead in clean energy, as their global leadership position in batteries and hybrid cars demonstrates.

ITIF's *Atlantic Century II* study found several Asian nations toward the lead in the race for global innovation advantage. Moreover, it found that Asian countries scored well, both on overall scores and on change scores. While China ranked thirty-fourth overall, it is quickly catching up to—and

in some cases surpassing—the United States and Europe in terms of aggregate scientific publications, patent applications, and science and engineering graduates. China's rapid ascent is reflected in the fact that it ranked first in rate of change in enhancing its innovation capacity during 1999–2011 in ITIF's 2011 *Atlantic Century II* study. China's technological prowess can no longer be dismissed with a simple wave of the hand. But China is not alone among major Asian economies in significantly bolstering its innovation capacity since 1999. In fact, in ITIF's *Atlantic Century II* report, Korea ranks second, Singapore eighth, and Japan seventeenth on improving their innovation capacity since 1999.<sup>39</sup> Put simply, these four Asian nations, plus Taiwan, are strong innovation competitors—and getting stronger.

For its part, Korea has the distinction of being one of the fastest-growing economies in history, having the same per capita income as Afghanistan in the 1950s, and now having a per capita income equivalent to that of the United States in 1979. Like Japan, Korea focused societal investment on manufacturing industries, and its companies moved up the value chain to produce better-quality and more complex products. (Remember the poor quality of the original Hyundai cars?) Taiwan also has grown rapidly, first being an assembler of commodity technology products, but quickly moving up the value chain to become a force in its own right in manufacturing high-tech products. And Japan, ignored by many U.S. economic pundits as an economic basket case, is in fact much healthier than overall GDP figures indicate, in large part because this number reflects the declining age of its working population as the Japanese society ages. In fact, Japan has slightly outperformed the United States in per capita income growth since the early 2000s.<sup>40</sup>

But historically, much of the innovation in Southeast Asian nations has been a matter of copying innovations produced elsewhere, particularly in the United States, perfecting and building on them, and then exporting them, usually to the United States. The strength of these nations has largely been around engineering prowess. Two questions in particular face these nations: First, will they be able to develop truly entrepreneurial economies and at the same time grow the productivity of their anemic nontraded sectors? As these nations advance, development through adoption of existing

innovations will prove harder. They will need to develop stronger abilities to truly innovate on their own. This will require real risk taking and break-the-mold entrepreneurship, which to say the least is hard in Southeast Asia. Japan in particular has very low levels of venture capital investment and its new business starts are quite low. And in China, the educational system and the culture continue to produce individuals who do not question the status quo, a key factor in enabling entrepreneurship.

The second question facing Southeast Asian nations is whether they can find a way to grow without relying almost solely on exports. While Japan boasts world-leading exporters of manufactured products—think Hitachi, Panasonic, and Toyota—its nontraded sectors are decidedly subpar. Japan's service sectors have achieved but a fraction of U.S. service-sector productivity levels. Japan's retail sector has achieved barely half of U.S. retail productivity levels, while its construction and food-processing industries have reached only 40 and 33 percent of U.S. productivity levels in these sectors, respectively.<sup>41</sup> Low levels of service-sector productivity explain why the whole of Japan's economy, even with some of the world's most productive manufacturing industries, is only 80 percent as productive as America's. When only about one-quarter of your economy is growth oriented, you can't grow very fast. Low service-sector productivity also afflicts Korea. As Kim Jung-Woo of the Samsung Economic Research Institute notes, "Compared to the biggest OECD economies, the productivity of South Korea's service industries appears to be low. If South Korean service industries' productivity continues to remain low while their weight in the GDP grows, it could undermine the productivity of the nation's whole economy."<sup>42</sup> But this should come as no surprise. Fifty years of economic policy in almost all Asian countries have focused on only one goal: becoming export powerhouse. The domestic serving sectors were left to atrophy.

This same dynamic is even worse in other Southeast Asian nations, especially China and India. Thus, the challenge for the poorest Southeast Asian nations like China and India is simple: Can they embrace productivity and markets? What probably strikes many visitors to India and China is the building boom, which is evident almost everywhere. But what visitors may not notice as readily are the rampant levels of inefficiency and overmanning. What's done in the United States by one or two workers is often

done in China and India by a multitude. At a recent visit to China, we found our hotel's front desk staffed with seven or eight clerks, even though we never saw more than two or three other guests there. At the pool, three workers staffed the cabana, although this being December, we saw only one hearty guest braving the unheated pool. At a nearby park, seven government workers were huddled together to weld one chain. At a local deli, three people handled paying for the sandwiches: one put your sandwich in a bag, another took your money, and a third put the money in the register and handed change back to the second person. A shopping "mall" might have hundreds of tiny vendors all selling pretty much the same small selection of items (toys, jewelry, electronics, and the like). India is even worse. At airports, five workers accept passengers' boarding passes, a job that would be done by one worker in the United States. To fill potholes on a street, fifteen workers went back and forth carrying the gravel in buckets atop their heads. The examples could go on and on.

This is why, despite industrialization and technological advancement, output per Chinese and Indian worker is just 14 percent and 8 percent, respectively, of U.S. levels. Perhaps they were taking Milton Friedman's tongue-in-cheek advice literally: While visiting a developing Asian country where a new canal was being built in the 1960s, he was shocked to see that instead of modern tractors and earthmovers, the workers had shovels. When he asked why there were so few machines, the government official explained: "You don't understand. This is a jobs program." To which Friedman replied: "Oh, I thought you were trying to build a canal. If it's jobs you want, then you should give these workers spoons, not shovels." China and India are by no means the only nations who prescribe "spoons."

Why is this featherbedding so high and productivity so low? We spoke to a CEO of a major Indian manufacturing company and expressed puzzlement as to why so many Indian operations were so overmanned. Instead of agreeing and complaining about how Indian workers and governments force companies to be inefficient as we expected him to, he replied "India cannot afford productivity, we need the jobs." Like so many business and government officials in developing nations, he had bought into the myth that productivity kills jobs. When the CEO of one of India's largest compa-

nies says this, you know there is real resistance to change. But India has a long tradition of supporting inefficiency. After independence from Great Britain, the new government passed laws limiting the size of certain enterprises in order to create jobs. For example, pencil makers could grow no larger than fifty employees, which resulted in India having one of the world's most inefficient pencil industries, meaning that few Indians could even afford a pencil. India, after all, was the inspiration of much of the nonsense spouted by E. F. Schumacher in his best-selling antiproductivity book *Small Is Beautiful*.

With productivity so low, you'd think that raising it would be job number one for countries like China and India.<sup>43</sup> But it isn't. To the extent that China and India are focused on growth, it's on high-tech growth for export markets. Both nations want to get rich not by across-the-board productivity gains, but by restructuring their industrial mix toward more productive sectors. For India, this means sectors like computers, biotechnology, and IT services. For China, it means pretty much every technology-based export industry. This approach is much easier politically than actually encouraging the domestic competition and "creative destruction" that are needed to drive across-the-board growth.

Even if they could succeed in increasing their global share of high-tech production, it's not the path to growth. For example, if India could raise productivity in its retail trade and banking sectors to just 30 percent of U.S. levels (currently, they are at 6 percent and 9 percent, respectively), it would raise its standard of living by more than 10 percent. This would create more wealth than the entire Indian IT services industry. Likewise, Chinese economic officials are on a campaign of "industrial restructuring" to move away from low-value-added industries to higher-value-added ones such as autos, electronics and information, and petrochemicals. But even if they can expand these industries by 50 percent and even assuming that they account for around 10 percent of Chinese jobs and are 50 percent more productive than the industries they replace, China only will have generated the equivalent of fourteen months of economic growth.

These dual economies (a few world-class exporters and a lot of subpar domestic serving firms) in Southeast Asia are no accident. Southeast Asian

economies are not set up to be high-productivity economies for the simple reason that the *raison d'être* of their economic strategies since WWII has been export-led growth. In other words, economic planners bought into the notion that the way to grow your economy is to shift your industrial base to high-value-added, export-based sectors. And they did so quite successfully.

Yet countries like Japan, with their myopic focus on export-led growth, largely missed the greater opportunity to improve national economic growth by increasing the productivity of their domestic sectors, particularly through the application and diffusion of general-purpose technologies such as IT. Indeed, Japanese firms have invested much less than U.S. firms in productivity-enhancing IT. Economists Jorgenson and Nomura find that investments in IT can explain the productivity differences between the United States and Japan since 1990. The authors found that Japanese productivity levels increased from 52.4 percent of U.S. productivity levels in 1960 to 86.1 percent in 1990 (during the Japanese economic miracle). Yet, since the mid-1990s, the productivity gap between the two countries has widened to 79.5 percent. Fukao and Miyagawa suggest that sluggish Japanese productivity growth after 1995 has been due to insufficient investment in IT capital.<sup>44</sup> Japanese firms may know how to make computers, but they do not use them as well as U.S. firms do. This is not because they don't know how to use them, but because using them the right way is too disruptive. Japanese corporations continue to rely on custom-designed software instead of standard, off-the-shelf software that American firms use, in part because this is a way to keep their workers from moving to competitors' firms where they'd have to learn a whole new system. It may keep their workers tethered, but it keeps their productivity low.

If Southeastern Asian nations wish to raise their living standards, they would be much better off abandoning their mercantilist, export-led strategies in favor of a broad-based innovation and productivity strategy. The path to higher incomes lies in raising domestic productivity by all firms in all sectors, including in unglamorous sectors like hotels, restaurants, retail distribution, utilities, and government services. To take just one example, the use of IT in all sectors of the Chinese economy was responsible for 38 percent of the increase in the country's productivity growth from the late

1990s to the mid-2000s.<sup>45</sup> Boosting efficiency in the economy, in part by using more IT but also by creating the competitive and market conditions for firms to become more efficient, is the royal road to growth.

Countries relying predominantly on export-led strategies risk being a one-trick pony: They may reach the technological frontier and boost growth for a while, but they are liable to languish there, or perhaps even decline if global export markets become saturated and as countries with more robust service sectors pass them by. Clearly, this explains Japan. Once it caught up to the world technological frontier by the 1980s in industries like automobiles, consumer electronics, and semiconductors (by using an imitative catch-up strategy based on export-led growth) its growth slowed, not having as much success in several key technologies that have subsequently emerged, notably biotechnology and IT usage.

But it also explains China, Korea, India, and many other Asian nations that all looked to Japan as the model: crank up the export machine, including through a wide array of unfair or dubious trade practices, and sit back and reap the benefits. For example, Jong-Won Yoon, a leading Korean economist, reflected this when he wrote: "The Korean economic miracle has been based on efficiency in mass production and an export-orientation strategy. . . . [But] for a recovery in the potential growth rate it will be necessary to shift to a high-value-added industry structure."<sup>46</sup> In other words, just find an even higher-value export sector to ride to prosperity.

For Japan, the benefits are over; for the Koreans and Singaporeans, they are coming to an end soon; and for China, they will continue but plateau at some point in the future unless China changes course. There's pretty much no way Japan can continue to grow through the tech-mercantilist model. It remains to be seen whether it can summon the understanding and political will to shift strategies—for doing so risks alienating powerful political constituencies that enjoy the safety of lack of competition domestically. It's even worse for the Japanese "wannabes." Nations like China are on a path to becoming Japan, with competitive export sectors but woefully lagging domestic services sectors. However, unlike Japan, China will never get there: it will not be able to generate the needed trade surplus because the United States and Europe are no longer in a position to import at high

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enough levels. You can only take out “bank loans” for so long before the bank won’t lend to you. And, eventually, China will have to stop giving other nations products for nothing in return.

Japan in particular has its own unique challenges. In many ways, Japan is a contradiction. It’s home to companies that dominate global markets in many areas. Government works closely with industry to help it remain technologically cutting-edge, including having leading-edge broadband Internet networks. This is the Japan Inc. that was so much in the news in the 1980s and 1990s and is still a force to be reckoned with. But at the same time, Japan is a nation where true innovation is rare, where entrepreneurship is looked down upon, and where most young people want the security of large corporations. It’s a place where many industries, especially ones serving national markets, are protected from real competition. It’s a place with relatively slow productivity growth, and very low levels of corporate adoption of IT.

For Japan, we posit that the choice is between the vision of Japan Inc. or the one exemplified by Takfumi Horie. A relatively young entrepreneur who founded Livedoor, a Web site design operation that grew into a popular Internet portal, Horie became a billionaire, the likes of similar high-tech millionaires in America. Similar to his typical American counterparts, he tried to buy a sports team. He also tried to take over a broadcasting company without its approval. And he was criticized by conservative business circles in Japan for his unconventional manner—including his informal attire (such as wearing T-shirts to business meetings). Horie was everything Japan Inc. was not. Perhaps this is why in 2007 he was convicted of securities fraud. Whether he was guilty or simply a target of the establishment because he had the audacity to shake things up, we have no idea. However, it is clear that Japan would benefit from more people like Horie (leaving aside the purported securities fraud).

In other words, the challenge for Japan is whether it embraces a more dynamic and entrepreneurial economy and the risks that brings, or tries to optimize Japan Inc. the best way it can. Sticking with the latter brings significant risks, the two primary ones being failure to increase productivity in Japanese firms and difficulty in developing new, entrepreneurial companies.

China has different challenges. At the risk of being flip, perhaps the best analogy with regard to the choice confronting China is whether it will be the Borg or the Klingons. In the futuristic TV series *Star Trek: The Next Generation*, the United Federation of Planets, a collection of largely democratic, freedom-loving planets in the galaxy, faces its greatest threat: the Borg. The Borg is a pseudo race of cybernetic beings that exists as a collective. It operates solely toward the fulfillment of one purpose: to add the biological and technological distinctiveness of other species to their own in the pursuit of perfection. This is achieved through forced assimilation, a process that transforms individuals and their technology into the Borg.

The Borg is a useful analogy for what appears to be Chinese innovation policy: to forcibly assimilate all foreign technology into the Chinese collective so that China can become completely self-sufficient. This appears to be the Chinese strategy: don’t trade for things in industries China is weak in, try to dominate every industry. Indeed, China’s 2006 Medium and Long Term Technology Plan reads like a plan to dominate virtually every advanced technology sector. The problem with the Borg strategy is twofold, as chapter 7 discusses. It’s ultimately a costly strategy for China since its citizens must give up massive amounts of current consumption for the hope of future consumption, partly because so much is wasted. And it ignores the vast benefits from boosting the productivity of sectors that aren’t traded in global markets. But unlike the Borg, China can’t entirely consume other worlds. China’s dependence on the U.S. economy—especially given its own underdeveloped services economy—means that if China continues to do too much damage to the U.S. economy, it’s only dampening its long-term growth prospects, especially if it seeks to continue to grow primarily through exports.

The alternative to the Borg scenario is for the Chinese to follow the Klingons. The Klingons, a race in the galaxy and once enemies of the Federation, realized that they would prosper if they aligned with and joined the Federation as partners—which they did, to their clear advantage. In some ways this describes China’s choice. They can continue to follow the Borg strategy, which ultimately will result in conflict with the rest of the world, or they can join the “United Federation of Nations” as a full partner, and behave responsibly. Behaving responsibly means renouncing IP theft

(including cyber-theft and industrial espionage), letting their currency shift in response to international market signals, abiding by the rule of law, and generally moving away from state capitalism. The choice is theirs, although as we note in chapter 8, America and Europe can and should help them move in this direction.

Finally, India has its own question and challenge: Can it reduce corruption and ineptitude by government officials? As the *Economist* recently asked, "Is Indian capitalism becoming oligarchic?" For all of its success as a global IT offshoring hub, India suffers from uncompetitive domestic markets and inept and sometimes corrupt governments.<sup>47</sup> One Indian corporate lobbyist described the central government as an ATM machine and "our shop." It can take years if not decades to get infrastructure and other projects through the government approval maze. And much of the economy is still operated by state-owned enterprises and long-standing private enterprises with connections to the government. According to the World Bank, only four out of every ten thousand Indian firms go bankrupt each year, compared to three hundred in the United States. Without effective churn to weed out inefficient and inept firms, it's hard for an economy to be innovative. India could take an important and symbolic step in this direction by allowing big-box retailers such as Walmart and Tesco to sell directly to consumers and not be required to enter into joint ventures.<sup>48</sup>

Finally, it's important to point out that Asia and America face almost opposite challenges. By and large, America has a highly productive and innovative domestic services sector. Its hotel, insurance, logistics, and retail sectors are the best in the world. New business models in services industries appear all the time. Companies use high levels of IT and in effective ways. But it's America's export sector that is in crisis. For much of Asia, it's the opposite; their export sectors are vibrant and productive and their domestic service sectors languish. But for both, innovation is the answer: for America, an innovation and innovation policy built around traded sectors; for Asia, one built around domestic sectors.

#### *Latin America: Can Government Get Out of the Way?*

A century ago, Argentina was one of the richest nations in the world. Anyone visiting Buenos Aires sees the evidence of this in magnificent,

century-old cathedrals and promenades. Today, it barely qualifies as a developed nation. But this is the tragedy of Latin America. Like the Eastern Bloc nations after WWII, Latin America wasted decades, in large part due to misguided economic policies and fragile, often corrupt, political regimes. With Latin American nations switching between socialist regimes that want to regulate and even confiscate private-sector growth and corrupt dictatorial right-wing regimes, it has been difficult to achieve market-based entrepreneurialism supported with smart innovation policies. On top of this, a culture that gave short shrift to science and engineering, preferring the elegance of political theorizing, made it hard to develop a real innovation economy. Finally, a deep distrust of competitive markets in many Latin American nations, including Argentina, Brazil, and Uruguay (each with the rate of citizens' favoring competition lower than the United States by 40, 66, and 41 percent, respectively), has meant a willingness to tolerate uncompetitive markets and the inefficiency and stagnation that come with them.

Perhaps the most significant barrier was that in the 1960s and 1970s, many Latin American nations latched on to the failed import-substitution industrialization (ISI) model of economic development, thereby rejecting the liberal, GATT-based, free-trade and open investment regime institutionalized after WWII.<sup>49</sup> Whether the measure has been growth rates, current account balances, or income distribution, the ISI strategy has performed poorly, for several reasons. ISI failed because it depended on markets that were too small or too poor to provide economies of scale and on demand conditions that were too isolated to produce globally competitive industries. This typically resulted in inefficient production of bad products by insulated state-owned and private enterprises.<sup>50</sup> The stiff tariffs and restrictions that Argentina and Brazil place on imports of foreign computers and components in an attempt to spur development of local high-technology industries, such as computers, are an excellent example of failed ISI policy. These policies have only had the effect of raising IT prices for domestic players, causing productivity growth in the service sectors of these economies to languish. But the political system keeps them in place, despite their costs to consumers and the economy. For example, in 2009, Argentina's new president, Cristina Kirchner, revived the country's 1970s-era protectionist industrial policies by imposing restrictive import-licensing

requirements and applying what's known as *el impuesto*, or the Big Tax—a doubling of the value-added tax on imported electronics.<sup>51</sup> Moreover, the Argentinean government is requiring some manufacturers to match every dollar worth of products they import to the country (such as component parts) with a dollar's worth of exports, an approach it's calling export equalization.

Unfortunately, the damage done by such poor Latin American economic policies continues to impact the innovation capacity of countries like Argentina, Brazil, and Mexico today. ITIF's *Atlantic Century II* study found Brazil to rank just thirty-eighth, Mexico fortieth, and Brazil forty-second out of forty-four nations and regions in innovation capacity. Worse, these countries are in the bottom half at rates of improvement in innovation capacity since 1999, with Brazil coming in twenty-sixth, Mexico twenty-seventh, and Argentina thirty-second.

Thus, the challenge for most of Latin America is to embrace democratic, rule-of-law regimes combined with free markets and robust innovation policies. Fortunately, there is evidence that the forces of innovation and innovation policy are emerging in several Latin American countries. Colombia has launched an ambitious and thoughtful innovation strategy called *Colombia 2025*.<sup>52</sup> Uruguay has developed a national innovation strategy and launched a national innovation agency, which has as a key mission assisting Uruguay's entrepreneurs. After the fall of the Pinochet government, Chile embraced a democratic path that both respects markets and supports a role for government in innovation policy. Brazil has developed a national industrial strategy that includes a focus on innovation and industrial leadership in sectors like pharmaceuticals, aviation, and renewable fuels, although it will do better to focus on its services sectors too. But for now, these are the exception rather than the rule. For Latin American nations to begin to move up the rankings in the race for innovation advantage, such measures will have to become the norm.

## Conclusion

No country or region has it right just yet. Each has at least some strengths, although some have more than others. Finding that sweet spot (balancing

individuals and society, present and future, dynamism and security) that most favors market-based innovation and government innovation policy will be an enduring challenge for every nation. To go back to our sports analogy, winning the global race for innovation requires hard work and commitment on the part of individual nations. And if they can do that, they will see their standings go up relative to their competitors. But that won't be enough to maximize global innovation. We need to move innovation from the minor leagues to the major leagues, and the way to do that is to rethink the overall global innovation governance system.