

THE US MANUFACTURING RENAISSANCE



*How Shifting Global Economics
Are Creating an American Comeback*

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Preface

The economic shifts that were set in motion in 2001 when China entered the World Trade Organization (WTO) are still reverberating around the world. A determined China sought to become a manufacturing powerhouse, and it did. The subsequent wave of outsourcing from the United States to China forced those US manufacturers that remained to become efficient or go out of business.

While US companies adjusted to the reality of China as a low-cost manufacturing source, China has felt the effects of becoming a rapidly developing economy. The most striking effect is a rapid rise in wages, which now threatens China's ability to offer low-cost manufacturing in a variety of industries.

Assuming current trends continue, by 2015, when adjusted for productivity differences, the costs to produce many goods in China and land them in the United States will be about the same as the costs to produce in the United States. The implications for the US economy are enormous, as is the responsibility on the part of the public

and private sectors to prepare for reshoring and increased competitiveness with the rest of the developed world.

You are reading the first part of what is clearly a work in progress. This is a story that is still developing and is neither comprehensive nor the last word on the subject. Our research is continuing on many topics that will be published over the coming months, including fundamental issues such as the impact of automation and how the integration of software and lower-cost electronics in the production process will change the basic labor/capital tradeoffs.

Rather than waiting, we believe it is time to provide our readers with a perspective on many of the changes that are underway as the rebalancing of the economics runs its course.

Please stay tuned for updates on *Made in America, Again*.

Introduction

An American Manufacturing Comeback

Nothing is made in America anymore,” Eileen Sirkin remarked one day after a trip to the mall. Eileen, who is Hal’s wife, is extremely bright and educated, with a PhD in molecular genetics from the University of Chicago. She follows current events closely, so more often than not she’s right in her observations. A quick examination of items in your own home or office—your shoes, your clothing, the chair you’re sitting on—would probably reveal few products that were “Made in the United States of America,” so you probably agree with her.

Well, we’re happy to tell you that she, and you, are wrong. The United States actually manufactures more than 70% of everything it consumes (more than most other countries), according to data from the US Department of Commerce. What’s even more surprising is how strong manufacturing is in industries that have experienced extensive outsourcing. The United States still makes 36% of the \$467 billion in electronic products it consumes annually, and it produces more electronics for domestic

consumption than it imports from China, the United States' largest external supplier, for example. And 52% of home appliances, 61% of machinery, 70% of transportation products, and 71% of furniture sold in the United States are also made domestically.

Those are pretty impressive numbers considering the conventional wisdom that America doesn't make anything anymore. According to the Department of Commerce, the only categories of manufactured goods for which the United States doesn't make more than 35% of what it consumes are apparel, footwear, and accessories—and these account for only 2% of total manufactured goods sold in the United States. Those numbers are even more impressive when you consider the rush to China that US manufacturers made after China joined the WTO in 2001.

In fact, US manufacturing is far from dead—it's in the early stages of a resurgence.

THE RUSH TO CHINA

Starting in 2001, lured by the promise of exceptionally cheap labor (an average of 58 cents per hour), companies flocked to manufacture in China, eventually making it the default location for goods of all kinds. Everyone just assumed China was, and would remain, the logical choice for manufacturing. Companies poured capital and talent into China, building plants and developing supply chains. One automaker was so eager to get its employees to source goods from China, regardless of the cost, that it tied its procurement department employee bonuses to the percentage of goods those employees' sourced from

China—not the traditional cost-savings metrics used in procurement. These companies believed that buying from China was always the lowest-cost option.

And China came with another bonus: 1.3 billion people who were going to be joining the consumer society. Companies manufacturing in China could also sell what they made to a fast-growing market.

As a result, China rapidly became a manufacturing and exporting powerhouse, dominating initially in such categories as clothing, shoes, and many electronic devices. China expanded its scope to include such categories as furniture and household appliances. The China juggernaut seemed unstoppable, and it became conventional wisdom that US manufacturing was dying.

While there is no denying that China has become a force to be reckoned with, and will remain so, the conventional wisdom that paints the future of American manufacturing as doomed is wrong—just as it is about the present. The Boston Consulting Group (BCG) has identified seven “tipping point” industries in which, starting around 2015 and lasting through the following decade, it will make economic sense to manufacture some items in the United States. Those industries are:

- Computers and electronics
- Home appliances and electrical equipment
- Machinery
- Furniture
- Fabricated metals
- Plastic and rubber products
- Transportation goods

Goods of these types account for almost \$2 trillion in US consumption and nearly \$200 billion of the almost \$300 billion in manufactured goods the United States imports from China each year.

How can this be possible, when in 2010 the media were full of stories of the decline in US manufacturing and the rise and dominance of China? While such stories are dramatic and make for good rhetoric, they ignore some key facts and significant trends. For example, between January 2010 and August 2012, manufacturing employment in the United States increased in 27 out of 30 months. In contrast, in the 96 months between 2002 and the end of 2009, manufacturing lost jobs 83 times—and had been on a downward trajectory since the 1970s.

However, it's what's happening in China that is helping to put US manufacturing on a growth trajectory.

WAGES ON THE RISE IN CHINA

People are missing the story about wage growth, productivity differentials, and labor content in China—and the implications of these. In late 2009 some of our colleagues in the Boston Consulting Group who work in China started talking about the sharp wage hikes for China's factory workers. They saw that the 15%–20% annual pay increases would eventually pose a problem for Chinese manufacturers, for whom incomparably cheap wages were a huge advantage. We knew that wages were rising fast in China, but we were surprised by the size of the increase. While China theoretically has a huge

workforce, the demand for skilled, trained workers is high, thus driving up wages.

Then we realized that in 2010 the average American worker was 3.4 times more productive than the average Chinese worker. Therefore, to achieve the same level of output in China as in the United States, you need to employ 3.4 times as many Chinese workers as American workers. This makes economic sense when wages are extremely low (in 2001, wages were 22 times higher in the United States than in China), but as wages rise, the costs can become prohibitive.

This realization got us thinking about the industries with high labor costs versus those for which labor accounted for a lot less of the cost. The first industries to go to China were ones with high labor—goods such as shoes and clothing—in which labor often accounts for more than half the manufacturing cost. As China became more experienced and US manufacturers became more accustomed to working with companies 5,000–7,000 miles away, many higher-end goods that involved less labor began to be produced in China as well.

We realized that if effective wages continued to rise rapidly in one economy (China) and not in the other (the United States), at some point it would no longer make economic sense to outsource manufacturing of certain types of goods to that former economy—and it would make more sense to make those goods in the latter economy (or perhaps another country).

Shortly after we first started thinking about the implications of the wage trajectory in China, Hal was at

a client board meeting listening to the board members talk about their plans to build a new manufacturing plant in China. At the time, the company (an industrial manufacturer) had 80% of its production in China, and things were going well, so the company wasn't considering anyplace else, least of all the United States. Although we hadn't done the math yet to determine the crossover point (where the costs to land goods in the United States are equal to the costs to produce them in the United States), Hal said, "Shouldn't we think about other locations, like Vietnam, India, and Indonesia, and why not give the United States a look?"

The board members all looked at Hal as if he had lost his mind, but the CEO nevertheless humored him. Hal took out a calculator and compared costs for five years out, in 2015, based on rapidly rising wages in China and stagnant wages in the United States.

Why calculate the math five years out? When it comes to manufacturing, you have to think long term. It takes several years to get a plant up and running and to develop a supply chain, and companies count on such plants being viable for a good 20 to 30 years, so making a decision based on current economic data doesn't make sense.

2015: THE LIKELY CROSSOVER POINT

We got lucky. It turns out that five years down the road was the right guess. When we did the math, we discovered that in 2015, the total cost difference (after adjusting for productivity) between manufacturing in China and in the United States would be less than 10%. When you factor

in the costs of doing business thousands of miles away, which includes costs you can measure (such as those for transportation and the supply chain) and the ones you can't but that are still important (such as navigating cultural differences and being 5,000–7,000 miles away from the actual manufacturing facility), the true savings become minimal.

When the initially skeptical board members looked at the calculations, they said, “You know, maybe we should take a full look at where to locate the next plant.” The full study convinced the board and the management team that it made sense to manufacture in the United States, so the company expanded its capacity at a US plant, adding several hundred jobs for American workers.

This company is not alone. Here are just some of the companies that have rethought their supply chains and production locations: Ashland Inc., Coleman, ET Water, Farouk Systems, Ford, GE, Master Lock, NCR, The Outdoor GreatRoom, Peerless Industries, and Sleek Audio. Among the reasons, aside from cost shifts related to wages: a simplified, shorter, lower-cost supply chain that responds more quickly to customer needs; reduced costs of capital; lower shipping costs; greater control over manufacturing processes; the rule of law; and shorter lead times. While the reasons vary, the result is the same: more production and more manufacturing jobs here in the United States.

When deciding where to build new capacity, companies need to do the math. The calculations must be based on a holistic understanding of the total costs

of making a particular product for a particular market in a particular place, and the economic trends that will influence those costs in the future. The United States can't go head to head with China in every category now, but for those products where labor content is relatively low, it will often make sense to manufacture in the United States for sale in the United States.

We don't expect the very-high-labor-content goods such as footwear, apparel, and accessories to return to the United States. But we do think goods that typically have moderate levels of labor content—say, 25% labor content—will be considered for return.

Take an automotive part whose labor requirements are only 25% of the total cost. China has a labor cost advantage of 39% overall, but when one accounts for the relatively low cost of labor for this product, the China advantage works out to be less than 10% of the total cost. At that differential, the other factors wipe out the savings.

THE IDEA BECOMES A TREND

Certainly our colleagues and the companies that have already “done the math” are not alone in rethinking China. Consider these findings from our April 2012 survey of manufacturers: more than one-third (37%) of respondents, all of whom are US-based manufacturing executives from companies with sales of more than \$1 billion, plan to bring or are actively considering bringing production back from China to the United States. The figures are even more impressive for larger companies, those with more than \$10 billion in sales: one out of two says it plans to

consider or is actively considering reshoring production to the United States. And more than 40% of respondents in many tipping point categories are considering reshoring, led by companies engaged in rubber and plastic products, machinery, computers, and electronics.

These executives are losing faith that China is, or will remain, the undisputed land of low-cost manufacturing. Seven out of 10 respondents believe that sourcing in China is costlier than anticipated, and 90% of respondents believe that wages in China will continue to rise.

As China's labor cost advantage erodes, nearly all factors that executives use when deciding where to locate manufacturing of certain tipping point goods for the US market favor the United States, among the most important being product quality, proximity to customers, and ease of doing business..

GLOBALIZATION

For those who still question whether the United States can be or is a manufacturing power, we suggest you put it in the context of the evolution of an increasingly global economy, one in which companies redistribute work around the world based on the hunt for new pockets of cheap labor. In the 1970s, it seemed as if everything, from electronics to cars, was being made in Japan—and Japan Inc.'s rise came at the detriment of US manufacturers.

Starting in the 1980s with the rise of the Asian Tigers, new corporate challengers from emerging markets leveraged their low labor costs to gain a global competitive edge. These challengers found that they could compete

with incumbents to sell in their own domestic markets as well as in the developed world.

The challengers' ability to sell to and supply developed economies allowed them to learn and achieve scale. As they grew in size, scope, experience, and capability, they were able to improve the quality of their goods and also offer more sophisticated ones. They built R&D capability and, no longer content to make goods that others sold under their established brand names, created their own, new brands. In turn, this allowed them to extend their distribution capabilities and source components from other rapidly developing economies.

We saw such companies as Sony, Toyota, and Honda displace established American and European consumer electronics and car companies from their dominant positions in both the United States and Europe. Now Chinese companies are having their turn, including: BYD, the country's largest maker of rechargeable batteries, which competes head-on with Japanese battery giants; China International Marine Containers Group Company, one of the leaders in volume in the world's shipping container market; Galanz Group, which manufactures more than half the microwave ovens sold in the world; appliance manufacturer Haier; and Johnson Electric, the world's largest and most profitable manufacturer of micromotors.

A US RENAISSANCE

We are now entering a new phase of globalization, one in which the costs of manufacturing in the developing world are rising, and some countries in the developed

world are responding with increased productivity and innovation. Productivity-adjusted wages show the United States being about 33% lower than Japan and 25% lower than Germany. Just as the United States righted itself after being confronted by the specter of Japan Inc. and the Asian Tigers, a new balance is being struck between China and the United States.

In the coming years, many of the products that had been made overseas will become more cost-effectively made in or near the country of use, including the United States. Other factors affecting this shift include an increasingly flexible workforce where, in some instances, unions have agreed to implement two-tier wage scales and benefits, and, in others, nonunion workers have accepted lower wages and less-generous benefits than in the past; incentives from state and local governments; and an improved US export picture, thanks to higher labor productivity, lower wage rates, and low energy costs.

And the total effects of reshoring and increased exports will be profound. We expect that in this decade, this resurgence will create \$100 billion to \$150 billion in increased economic activity, and 2.5 million to 5.0 million jobs. (A range of studies shows that one new US manufacturing job creates approximately three non-manufacturing jobs.)

This is the recipe for an American manufacturing renaissance. It is about creating good jobs for America's children and their children and ensuring the long-term success of the US economy.

In the coming chapters, we will explore the impact of the fundamental changes to global economics that

we are aware of today. We will provide some historical perspective on how the United States has responded to previous threats to its manufacturing base, and explain why the US economy is able to react positively to those threats; why China succeeded, and the vulnerabilities that are now becoming apparent there; why the United States may be the best alternative to manufacturing in China, particularly in the tipping point industries; and what needs to happen to make sure this renaissance comes to pass. We'll also spotlight some companies that have already brought manufacturing back to the United States.

The economic shifts are ongoing and changing rapidly. We have further research under way to address additional impacts and we will share that research as we better understand its significance.

The US Economy Why It Takes a Licking and Keeps on Ticking

How did the United States get to the point of being considered a manufacturing has-been? This characterization is ironic for two reasons. First, anytime the US economy has been challenged, it has quickly recovered, just as it was designed to. Second, after World War II, when much of the world's production capacity was destroyed, the United States was not merely the top industrial manufacturer, but the *only* one. For the first decade after the war, while factories in the rest of the industrialized world lay in ruins, the United States was the planet's unchallenged manufacturing superpower.

By the mid-1950s, American workers were building around 40% of the world's manufactured goods, while the United States represented less than 10% of the world's population. If one uses that era as a starting point, as many pundits tend to do, then US manufacturing has been in perpetual retreat ever since. As much as people may sigh and long for the "good old days" when everything seemed to be made in America, the United States' position was not sustainable. The United States became a manufacturing

superpower by default; it was to be expected that other countries would restore their manufacturing capability. And as new, lower-cost manufacturing alternatives appeared, US companies sought to mitigate the cost advantage. By the 1970s, the US manufacturing value added had fallen to 25% of global share. It has remained at about 25% since then, further evidence of the inaccuracy of pictures portraying US manufacturing as dead.

Indeed, the death of American manufacturing has been foretold with every new wave of low-cost imports from a rising industrial power, each time accompanied by a fundamental shift in the global economics of manufacturing. And each time, the predictions proved wrong. The United States suffered through, and survived, many painful adjustments to the challenges presented first by Japan Inc., then by the Asian Tigers, and now by China, responding with surprising flexibility and speed to reemerge more competitive and more productive than ever.

WHY THE UNITED STATES IS ABLE TO BOUNCE BACK

Indeed, there is ample evidence to suggest that US manufacturing is still strong, and every reason to believe that the United States will once again beat back the threats. Both the way US business is structured and the fundamental nature of a market-driven economy allow the United States to respond tremendously fast to threats.

Each time it is pronounced dead, US manufacturing endures painful retrenchment and readjustment. But eventually it rises to the challenge and reemerges as competitive as ever. US industry doesn't curl up into

a ball. It responds; it adapts; it thrives. That is what Americans do.

The US economy, unlike any other, is structured to respond quickly to threats. It does not protect businesses, but instead encourages competition, invites innovation, and greatly rewards winners. Companies are allowed to fail (the bailouts of the banks and auto companies when the economy was in free fall in 2008 notwithstanding), and because companies know that it is about survival of the fittest, they must strive to succeed and excel. When companies do fail, they can either disband or reorganize, become leaner and stronger, not crippled by unmanageable debt or outsize obligations to creditors. The economy is nimble, and by extension, the companies that make it up must be so as well—and are allowed to be.

And while the United States offers some protection to the unemployed, it is far less generous than many other countries. One might argue that the mesh of the US social safety net is too coarse, and allows too many people to fall through, but the reality is this is how the United States works.

That is not to say that restructuring is effortless or painless, for either companies or individuals. But each time, the economy comes back stronger than ever. We are seeing this beginning to happen now, somewhat masked by the euro crisis. In short, the European system slows restructuring. The US system drives it to happen quickly.

BARRIERS TO EXIT

European governments are more inclined to subsidize or nationalize failing businesses than is the US government.

Also, European companies are hamstrung by barriers to exit, especially the generous job guarantees that can translate into multiyear payouts to redundant employees. The very things that once made Europe seem like a workers' paradise can hinder companies, because they have fewer levers to pull when the need to make drastic change presents itself.

Yes, there are tradeoffs to not having the same safety nets one sees in Europe and Japan, both for individuals and for companies. One can debate whether they're the right tradeoffs, but from an economic standpoint, the results of the US systems are staggering. The United States now produces 2.5 times as much manufacturing value added as it did 40 years ago, and does so with 30% less labor.

Still, the pain of the Darwinian US system was felt in many ways as factories closed, companies failed, banks wrote off losses, and workers had to learn new skills. But the US economy takes a licking and keeps on ticking, no matter the threat. It has done so each time. We characterize the US responses to the onslaughts of Japan Inc., the Asian Tigers, and China as complain, co-opt, and—finally, after suffering through a period of lost market share and a shakeout—compete. Oh yes, and win.

JAPAN PREDICTED TO DOMINATE WORLD MANUFACTURING

In the 1970s, the threat was Japan Inc., whose formidable conglomerates had mastered lean production and were backed by strong government industrial policies. The

news at that time was filled with stories predicting that Japan Inc. was going to take over the world, courtesy of the transistor radios, televisions, and cars it was manufacturing.

It wasn't always so. As Japan Inc. began its recovery from World War II and rebuilt its manufacturing capabilities, "Made in Japan" meant buyers were getting junk: cheap wind-up toys and leaky batteries. Even more sophisticated products were inferior. With its lack of the power and comforts US drivers demanded, the Toyopet—the first Toyota to reach US shores, circa 1957—didn't enthrall the US market, and neither did the Hondas and Datsuns (Nissan precursors that first showed up on US roads). The Toyopet was fuel-efficient at a time when gas was cheap; it was small, basic, and uncomfortable, unappealing to Americans for whom large, stylish cars were a symbol of mid-century American affluence. Japanese companies learned from their experiences, as Toyota is now one of the leading carmakers in the world.

Starting in the 1970s, as OPEC wreaked havoc with oil prices, fuel-efficient compact cars from the Land of the Rising Sun sped into popularity in the United States. With their dependability, low fuel consumption, and increasingly sophisticated styling, Toyotas, Hondas, and Nissans acquired reputations as smart choices for US drivers who wanted durability, value, and less time spent in the repair shop.

"Who would have believed that there could ever be a time when 'The Big Three' referred to Japanese car

companies?” former Chrysler CEO Lee Iacocca would later lament in his book *Where Have All the Leaders Gone?*

JAPAN LOSES ITS WAY

In the 1980s, Japan’s strong economy, spurred in no small part by its dominance in manufacturing, enabled Japanese companies to pour billions of dollars into US real estate and businesses. At one point, a reported one-third of downtown Los Angeles was Japanese-owned. In 1991, two years after Mitsubishi Estate Company of Tokyo bought Rockefeller Center, talk show host David Letterman joked that one of the great things about New York City was that “The Japanese keep their buildings looking so nice.”

That same year, humorist Dave Barry wrote, “French astronomers report that a vast, hitherto-unknown galaxy at the very edge of the universe has been purchased by Japanese investors.” Parents were having their children schooled in Japanese in the belief that it would become the new lingua franca of business.

However, the Japanese economic miracle started to unravel as Japan entered its “Lost Decades,” when its economy stagnated and population growth slowed. The cost of Japanese labor rose, its stock market grew overextended, and its real estate investments in the United States proved a costly distraction. The 1996 devaluation of the yen triggered a financial crisis that sent the Japanese banking system into shambles. A December 2002 *Time* magazine article entitled “Going Nowhere Fast” took note of the country’s underpopulated shopping centers,

crippling “mountains of bad loans,” and a labor force that was 40% less efficient than that of the United States.

Complain

US companies initially ignored Japan as a potential threat. Instead, they complained that the rising share of imported cars, steel, and televisions were due mainly to unfair trade practices, rather than giving any credit to advances or improvements in technology or to superior design. So American manufacturers kept doing things the way they always had, remaining in denial and refusing to believe that demanding consumers would accept “cheap” Japanese products—even though there was ample evidence to the contrary.

For years, US companies took no action as Sony and Toyota became manufacturing powerhouses. One US automaker redefined market share to take into account only those cars made by US nameplates, as if one stroke of the pen could make the problem disappear.

Eventually, though, many US companies embraced and even mastered the secrets to Japan’s success: the quality-control practices taught by American W. Edwards Deming, the *kaizen* philosophy of continuous improvement, and the design of products consumers wanted.

And they went beyond merely mimicking the Japanese manufacturers. They unleashed the incredible power of innovation in Silicon Valley, on Route 128, and in the Research Triangle, creating the thousands of companies that fueled the digital revolution, and bringing the United

States back to a leadership position with each successive wave of technology.

THE ASIAN TIGERS POSED THE NEXT CHALLENGE

In the 1990s, the Asian Tigers roared onto the scene. Hong Kong, Singapore, South Korea, and Taiwan possessed fleet-footed manufacturers with a knack for turning out cheap but good “copy-cat” products. South Korea and Taiwan’s particular strength in manufacturing and Hong Kong’s and Singapore’s international financial centers made the world take note of this fierce foursome.

Just as it had been predicted that Japan Inc. would decimate US manufacturing, now it was believed that the Asian Tigers’ combination of low-cost manufacturing, tech capability, and financial savvy would do the same. The pattern seemed familiar. Like many an early Japanese car, South Korea’s Hyundai, which appeared on US highways in 1986, started out as a joke—literally. “You can double a Hyundai’s value by filling it up with gas,” comedian Jay Leno quipped. Hyundai Motors ranked last in J.D. Power and Associates’ 1994 quality survey. But the carmaker listened to consumers’ complaints and worked to produce more-reliable, better-designed vehicles.

Over the following two decades, as with the Japanese cars, the Hyundai zoomed to reliability and sales success. Hyundai’s first SUV, the Santa Fe, introduced in 2001, gradually gained favor with US drivers—at some points, the car company couldn’t keep up with demand. In 2012 the Hyundai Elantra compact was named Car of the Year by Detroit automotive journalists.

For the most part, the Tigers profited by becoming both suppliers of key components and contract manufacturers for a wide range of goods bearing the brands of Western corporations that controlled vast production networks. With a few exceptions (e.g., Hyundai), most of the Asian Tiger companies didn't make finished goods, initially becoming low-cost suppliers to US and Japanese companies. Leveraging abundant cheap talent, government support, and lessons learned from Japan, these manufacturers from Hong Kong, Singapore, South Korea, and Taiwan cared more about volume than profit margins and innovation.

They cloned the components for everything from personal computers and displays to mobile phones. Along the way, Korea's Samsung and LG electronics rose in status from also-rans to smart choices for consumers looking for quality at reasonable prices. In 1997, *Businessweek* reported that investments in chip-making abilities by Korean and Taiwanese companies were paying off—at the expense of Japan's companies. “Yet with huge stretches of its product line under assault from Korea and other lower-cost Asian Tigers, profits are minimal,” said *Businessweek*.

Co-opt

A handful of Tiger companies, such as Acer, HTC, LG, and Samsung, succeeded with their own brands for export. But by and large, the Tigers produced few global giants such as Japan Inc.'s Toyota and Sony, and were largely relegated to the commodity portions of industry value chains, producing components. Once US business

figured out how to co-opt those capabilities, many of the Asian Tigers remained component suppliers.

Even more troublesome for the Tigers was an Asian financial crisis that started to rock their boat. “In 1997 many of the Asian Tigers and ‘Tiger cubs’ were suddenly tamed. They went from *being* an economic miracle to *needing one*,” Pepperdine University business school professor Terry Young wrote in 2000. World economists expressed doubt about the abilities of Korea’s *chaebols*—family conglomerates that were politically well connected but often mismanaged—to maintain profitability as they staggered under the weight of huge loans.

By the late 1990s, as the Tigers grew docile, American companies dominated the world in high-value industries such as microprocessors, aerospace, networking equipment, software, and pharmaceuticals. Manufacturing investment and output surged. US companies such as Apple, Cisco, Intel, and Microsoft reaped big profits by focusing their resources on innovation, design, and distribution.

CHINA’S TURN

Then, of course, came China, which for more than a decade has been the current threat to US manufacturing. With its combination of a seemingly limitless supply of ultra-cheap labor, a huge and rapidly growing domestic market, an abundance of engineers, a controlled currency, a government willing and able to lavish incentives on foreign companies that built factories, and, later, a huge and rapidly growing domestic market, China seemed

unbeatable. And indeed, the annual US trade deficit with China in goods was almost \$300 billion in 2009. It seemed as if China would roll up US manufacturing and leave the United States to be the farmers and bankers of the world. Of course, that sounds very similar to what was said about Japan during the 1980s.

Compete

This is what the United States is doing now with China. The competitiveness that characterizes the US economy and the ingenuity that allowed American companies in the late '90s to dominate the world scene in high-value industries and the then-nascent Internet sector is helping the United States rebound again. A fundamental difference in the ways the respective systems train people—in the United States, to think; in China, to follow—also gives the United States a competitive edge. Alternative perspectives and innovation, not conformity, are seen as the linchpins of success.

True, China presents some challenges the United States has not faced before. It's bigger, faster, and enjoys unprecedented access to the world's knowledge. Its population is four times that of the United States. China's nondemocratically elected government can move quickly to achieve its goals. Advances in technology and new regulations to promote international commerce make anything a business could need—information, data, talent, capital markets—almost instantly accessible. If Chinese manufacturers (or manufacturers from anywhere else, for that matter) want a car to have Italian styling, they

can easily approach an Italian car design firm and get it to design the look of the car. The Chinese also have a hunger for achievement and middle-class aspirations, driven in no small part by their access and exposure to the West. Also, China began with incredibly low wages—in 2001, when it entered the WTO, wages were 58 cents an hour—and a massive potential workforce of hundreds of millions of people.

US MANUFACTURING STANDS ITS GROUND

Yet all this does not add up to a story of relentless American decline. The United States' position as a global manufacturing powerhouse has barely diminished over the past four decades.

Thanks to the strongest productivity growth in the industrialized world, America's manufacturing output is almost two and a half times its 1972 level, even though factory employment has shrunk by one-third since then. Even today, the United States produces nearly three-quarters of what it consumes. While it imports around \$300 billion a year in manufactured goods from China, it makes \$3.4 trillion at home.

And the rush to China must be seen in context. Yes, since 2001, a lot of US factories closed and a lot of jobs were lost. But a significant number of those jobs were simply casualties of automation or more efficient production methods—trends that are reducing direct manufacturing employment everywhere in the world. In the absence of automation, an even greater number of jobs would have left as factories would have had to close altogether.

The higher the labor content in a category of goods, the more likely it was that the work would leave the United States, at least at first, because China's low-cost labor gave that country a huge advantage. In categories such as apparel and shoes, had such production not gone to China, it would probably have gone to another low-wage country. But in other categories, such as paper products, where labor costs are less a factor and transportation costs are reasonably high, almost all production stayed in the United States.

Even in industries that experienced extensive outsourcing to China in the past decade, a surprisingly large amount of production has remained in the United States. For example, the United States manufactures 52% of appliances, 61% of machinery, 70% of transportation goods, and 71% of furniture sold domestically. Even in electronics, where the United States manufactures only 36% of the \$467 billion in goods it consumes each year, it makes more at home than it imports from any other country, including China.

CHINA: THE BIGGER PICTURE

Even though on the surface China seems to represent a larger threat than any the US economy has faced before, many of the same dynamics have occurred in the past and will play out the same way, because the United States has the same arrows in its quiver that it has used before.

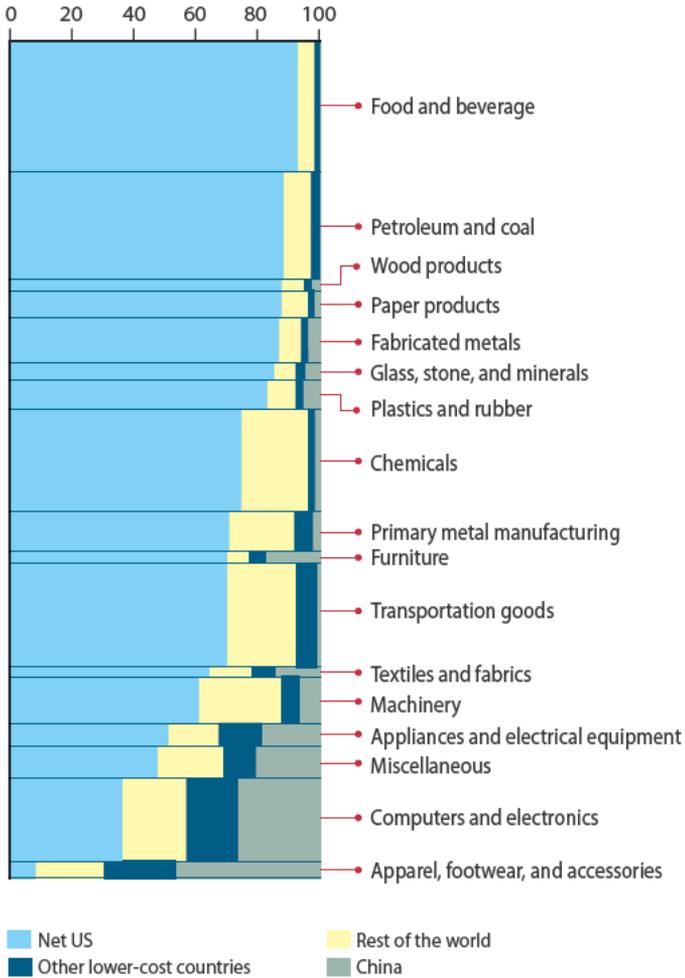
However, people often miss the similarities or are unfamiliar with the history, which causes them to have a distorted view of what is happening now and what is

likely to happen later. People tend to get caught up in the moment and to lack perspective. Generations X and Y are largely unfamiliar with the story of Japan Inc., and as far as they know or remember, the Tigers have been declawed. China's manufacturing won't go away. While Japan Inc. might have lost its dominance, it didn't disappear, and the Tigers may not be roaring, but they still have their place.

What is different about the US economy is its ability to restructure and adapt to new circumstances, unleashing its ultimate weapon: competitiveness. The fear that someone is gaining on you makes you run faster and harder. That is the essence of the United States' ability to recover quickly—and repeatedly.

Figure 1.1: The United States manufactures more than 70% of what it consumes

Manufactured goods consumed in US by source, 2010 (%)



Source: US National Census Bureau; US Bureau of Economic Analysis; BCG analysis

How China Became the Default Location for Manufacturing

China's rise as the default location for manufacturing has been the toughest challenge US manufacturers have yet faced. While many of the issues are the same as those the United States has successfully faced before, their order of magnitude is far greater, in no small part because China's population is four times greater than that of the United States.

China's ascent was enabled by its joining the WTO in 2001, when the average wage in China was a mere 3% of what the average American factory worker earned at the time. Even if Chinese workers were only 10% as productive, the labor cost savings were far more than enough to compensate for the difference in productivity. This cheap labor gave China such a great cost advantage that many US companies either started outsourcing manufacturing and assembly work to China or built their own plants there.

The first industries to go were those with high-labor goods, such as clothing and shoes, and eventually China

became the default option for a remarkable breadth of industries, from labor-intensive ones to heavy industry and technology. As a result, from 2000 to 2009, China's exports leapt nearly fivefold, to \$1.2 trillion, and its share of global exports rose from 3.9% to 9.7%, according to the United Nations Conference on Trade and Development.

During that same period, China's portion of global apparel exports increased from 17.4% to 32.1%. Its share of the world export market for furniture soared from 7.5% to 25.9%; from 4.1% to 19.6% for ships; from 6.5% to 27.8% for telecom equipment; and from 4.9% to 32.6% for office machines and computer equipment.

WHAT CHINA DID RIGHT

China's swift and sharp transformation into a manufacturing powerhouse was neither accidental nor lucky. China was brilliant in the way it went about attracting more capital and making it easy to lure manufacturing to its shores. China saw opportunity in its huge population, in its role as a nondemocratic society that could make and execute plans quickly, in the ability to control its currency, and in an increasingly global economy with an ever-growing base of consumers both affluent and aspirational. China's government leveraged its opportunities to engineer a manufacturing machine.

Perhaps the most important thing China did was build industrial clusters along its coastline, creating what amounted to "one-stop shopping" for manufacturers looking for low-cost alternatives and establishing China

as the easy, obvious choice. These clusters included universities to educate engineers and offered skills training to ensure a steady supply of qualified workers; a ready-made supply chain; new infrastructure; and state-of-the-art ports. The government helped companies source manufacturing equipment and find suppliers. Companies making shoes were located in one cluster; those making electronics were located elsewhere, and so on.

No other country has ever come close to replicating China's model or success with clusters.

Because clusters contain multiple companies in the same industry, companies that are competitors also become collaborators, cooperating with one another when needed. A company can outsource to another cluster member with similar capabilities those orders or parts of orders it can't handle. Therefore, companies in a cluster can boost capacity without incurring the costs of building new plants or facilities and thus satisfy the needs of their customers, who are seldom the wiser.

Clusters also give workers great mobility, as they can easily move from one company to another within the same cluster. This mobility has contributed to the wage increases that now threaten China's advantage. However, it also benefitted Chinese companies. When a worker from a Western company goes to a Chinese company, he takes with him knowledge acquired at the Western company's expense. Working at a Western company used to be considered the premier job, but Chinese workers now favor state-owned enterprises, seeing them as better-paying and more stable.

In creating clusters, which were facilitated by the government allowing people to move from rural areas to the cities, China also created its middle class. Those who moved were given the chance for a new way of life that was unimaginable only a decade earlier. Eventually, China's middle class will number 300 million—equal to the entire population of the United States—a vast domestic market for goods of all kinds.

Had China not focused on directing its economy toward manufacturing, it would be a vastly different country—and by every measure, a poorer one—than it is today.

THE CHALLENGES FOR CHINA—AND WITH CHINA

Ironically, the same factors that contributed to China's great and rapid success—a fast-growing economy, a government eager to boost companies and industry, a huge population that is highly motivated to succeed and become part of the middle class, the economic clout of that growing group, and a controlled currency—may create problems for the future. Possible unrest from an increasingly sophisticated middle class, rising wages, and overcrowded cities all stem from China's meteoric ascent and could threaten its ability to sustain growth and maintain its position as the world's manufacturer.

Some of these problems will be China's alone to contend with; others, such as how to deal with rising costs and wages, and issues with quality, present challenges and choices for companies doing business in China.

Wages

As we have discussed, the first challenge is rising wages. Annual pay increases of 15%–20% may be good news for workers, but not for the manufacturers, who are seeing one of their big competitive advantages evaporate. Wages in the Yangtze River Delta, China's most productive manufacturing area, were only \$0.72 per hour in 2000, then \$1.16 per hour in 2005, and rose to \$2.79 per hour in 2010. If the trend continues, wages will be \$6.31 per hour in 2015.

One of the reasons for wage increases is supply and demand: worker pay rises as the shortage of skilled workers becomes acute. We've even seen Chinese companies increase wages by 50% to 100% in one year to try to hang on to skilled workers. But that isn't always enough to engender loyalty to an employer. At each Chinese New Year, when workers go home to visit their families, factories report that a significant number don't return to their jobs. Skilled workers remain confident that they can always find a job; and the higher a worker's skill level, the greater her mobility.

Simply hiring employees willing to work for lower wages isn't an option for companies manufacturing in China. While in theory there is no shortage of potential labor in China, much of the population still lives in rural areas, away from cities and industrial clusters. Also, the current workforce is already trained; the learning curve and the expense of training a new workforce make recruiting a new army of workers an impractical solution, at least in the short term.

City versus Country

China has created two types of citizens: city dwellers, who have received most of the economic benefits over the last 10 years, and rural people, who are not allowed to move to the cities and who often are subsistence farmers, living much the same way people did a century ago. China has a strong incentive to keep people out of the cities and on the farm so that they can, in fact, farm. A decrease in the rural population means a decrease in food production, a concern for a country that is finding it increasingly challenging to remain self-sufficient for food. As the Chinese get wealthier, they move to a higher-calorie, higher-protein diet, which puts even more pressure on their food supply.

In already overcrowded cities, where people are tasting the benefits of prosperity (in many cases, for the first time), there is the potential for them to start questioning government policy. Once mere survival is no longer an issue, materialism is less effective at quelling dissatisfaction among the middle class. And with few outlets to express dissatisfaction in more modulated ways (such as being able to vote or read uncensored material), history shows that the possibility for unrest is greater. As writer Michelle Loyalka wrote in the *New York Times* in 2012, the Chinese labor force is no longer “just thankful not to go hungry.”

Currency

China's currency, the yuan, has also affected wage growth. It is controlled and has been allowed to appreciate at only

3%–4% a year. Recently China stopped increasing the value of the yuan because of a slowdown in its economy, but given the increasing cumulative trade deficit, this will probably only increase wage inflation in China.

To understand what is happening in China, one needs a deep understanding of the relationship of wages to productivity and labor content of goods. In 2010 the average US manufacturing worker was slightly more than three times as productive as the average Chinese worker in the Yangtze River Delta (YRD). So, the Chinese hourly wage of \$2.79 is actually equivalent to an hourly rate of \$8.62—still significantly lower than the average US wage of \$21.25.

If wages follow as we expect, in 2015 the average wage in the YRD will rise to \$6.31. Even if the productivity of the Chinese workers increases so US workers are only 2.4 times more productive—which would represent a massive productivity improvement on China's part—the effective wage rate rises to \$15.03. The expected average wage in the United States will be \$24.81, meaning China will have a 39% wage advantage.

To determine the overall difference in costs, one must consider the labor content. With a product for which labor represents only 25% of the total cost (tipping point goods), China's 39% wage advantage actually becomes a cost advantage of less than 10%.

So, by 2015 we expect the cost to produce tipping point goods in China to be about 90% of the cost to produce in the United States. Then you need to consider the cost of transporting the product to the United States,

and the costs and risks associated with managing an extended supply chain: quality problems, unexpected travel, intellectual property theft, and delays in getting new products to market. When you consider all these costs, China's 10% advantage melts away.

Interior Development Helps but Won't Solve the Problem

Simply transferring work deeper into China's less expensive interior provinces won't solve the problems of rising wages. The shortage of skilled workers is even more acute away from the coasts, so engineers and other trained workers living in the interior can command relatively high paychecks. Also, the absence of supply networks and logistics systems in these regions means that companies need to bring components in from elsewhere in the country.

An additional complication is the poor interior infrastructure: China's limited roads can't support trucks, and there are few trains. Remedying the inland infrastructure issue would take considerable time and money. And of course, the already-long supply chains and transportation times to the United States would get longer still.

Rising effective wages in the city are only one of the reasons manufacturing in China is becoming less attractive. As the cities and clusters have become more populated, and as demand for everything from housing to office and factory space to raw materials has increased, costs have risen accordingly. The cost of shipping has risen dramatically as well: when China entered the WTO, oil

was in the \$20–\$30-per-barrel range; now it's closer to \$100 per barrel.

Commercial real estate prices are dramatically higher in China's coastal cities than in most of the United States. For example, industrial land costs \$11.15 per square foot in the coastal city of Ningbo, \$14.49 in Nanjing, \$17.29 in Shanghai, and \$21.00 in Shenzhen. The national average is \$10.22 per square foot. Industrial land for new US manufacturing capacity in such likely places as Alabama, by contrast, costs only \$1.86 to \$7.43 per square foot; in Tennessee and North Carolina, the price ranges from \$1.30 to \$4.65.

Quality

When doing business in China, *caveat emptor* is the watchword, according to several of our clients. Different cultural values mean that substituting a lower-cost item without telling the customer is not unusual, nor is it considered a big deal. Contracts don't carry the same weight as they do in the United States and other developed countries. In the United States, when someone says he'll do something, generally he'll do it; in China, he may or may not, so you need to watch closely.

As a result, many companies that manufacture in China find that to ensure quality they must have additional layers of supervision and monitoring at various points in the supply chain: when they bring raw materials to the factory; after manufacturing, when goods are ready to leave the factory; during or after shipping. And these extra layers of inspection are not free. Companies report that

they often spend an additional 1%–2% of total product cost to ensure quality. People might have assumed they were getting good quality inspection, but unless they were paying extra and closely monitoring the inspectors, it's unlikely.

There have been numerous stories in the last few years about poor-quality products from China. For example, lead has shown up in everything from children's toys to baby food to toothpaste and dental restorations. In 2008, several reported cases of lead poisoning associated with toxic levels of lead in crowns raised concerns about Chinese-made dental crowns and bridges, just as China was getting its teeth into this industry.

NEUTEX

Issues related to quality, shipping problems, worker turnover, and time spent managing outsourcing relationships are among the reasons NEUTEX Advanced Energy Group Inc., (parent company of NEUTEX Lighting), which makes commercial and residential LED lighting fixtures, is pulling the majority of its production out of China and will make its products in a new 150-worker plant in Houston.

The company was launched five years ago when its founders, who were in the construction business, foresaw rising demand by retailers, schools, and other building owners for fixtures using energy-efficient light-emitting diodes (LEDs). Lighting manufacturing had been heavily concentrated in southern China for years, so NEUTEX at first outsourced there.

But the company says it encountered enormous quality problems. In some shipments from China, 55 percent of products were defective. “Products would come out of the same line with the same people, but we had huge variances,” NEUTEX CEO John Higgins told us. “Quality was just bad. The factories we relied on had the same problem with their suppliers. Here in the United States, if you get a warped part, you send it back to the manufacturer. Chinese factories would just go ahead and give you a product with a warped part. That was unacceptable. We could not sell those to our customers.”

NEUTEX conducted a thorough analysis of all its costs of manufacturing in China versus the United States. It counted the time staff spent on Skype speaking with partners overseas and tracking shipment deliveries. It valued the five weeks a year on average that Higgins spent travelling back and forth to China, rather than with customers, at \$150,000. It calculated the cost of tying up capital by paying in advance for goods that wouldn’t arrive for 80 days. On their tours of Chinese factories, NEUTEX managers learned that five times as many workers were sometimes employed for the same tasks done by one American worker. “Workers may have been making only \$400 a month, but we really were paying \$2,000 a month,” Higgins says.

The company also encountered increasingly costly supply disruptions. When transpacific shipping lines were short of capacity, they often bumped containers

from small customers such as NEUTEX at Chinese ports, delaying delivery for weeks and irritating those companies' customers. High staff turnover at Chinese factories caused more delays. One supplier abruptly told NEUTEX that it would take several months before it could fill an order. The reason: its workers were about to go on vacation for 23 days, and most would not be returning. The factory would have to hire and train a new workforce

NEUTEX decided it would be better off making fixtures in its own factory in Houston. "Five years ago, this wouldn't have made sense," Higgins told us. Although direct manufacturing costs are still around 5 to 6 percent cheaper in China, "when it comes to nuts and bolts, we believe we can produce for about 18 percent less here." Higgins also estimates that NEUTEX can fill orders for lighting products from US customers 60 percent faster. "Plus, we can better control our brand, our warranty, our reliability, and our delivery. We can't do that as easily in China."

DOING THE MATH: WHAT IT ACTUALLY COSTS— NOT WHAT YOUR ACCOUNTING SYSTEM SAYS

In reality, many companies are saving a lot less than they thought they would by sourcing from China. In the rush to capture savings from China, they missed many costs.

First, there's the expense of transpacific shipping. And because of the length of time it takes for offshore manufacturers to deliver goods, many US companies have

to keep large inventories at home, meaning they incur costs by renting or buying storage space. Waits of three months or longer for Chinese-made products to hit US store shelves means sellers of electronics and IT products may find their “state-of-the-art” merchandise has in fact become obsolete.

When US companies saved 20%–30% by sourcing in China, they could more easily absorb the costs involved in writing off shipments of defective or obsolete products or unanticipated overseas travel to sort out quality problems. However, when those savings dropped to 10% or below, these expenses took on increased importance and a new light was shone on other factors (e.g., being close to the customer, not worrying about the intellectual capital, and currency risk).

According to Harry Moser, founder of the Reshoring Initiative, a group that advocates bringing manufacturing back to the United States and helps small businesses do so, more than half of US manufacturers ignore at least 20% of the total costs of offshoring (TCO) products. Moser says that companies that do the math more comprehensively—that is, who look at TCO—often find they’re saving as little as 10% by offshoring, and that the accompanying headaches don’t merit the savings.

In many cases, US accounting and procurement departments simply haven’t yet learned all the variables they need to factor into the profit equations. Others, reshoring advocates have suggested, intentionally gloss over the extra costs of offshoring in order to make themselves look like innovative cost-cutters.

Moser believes that up to 25% of offshoring might return if all US companies looked at TCO. His organization has calculated that reshoring has already yielded 50,000 to 100,000 US jobs.

There are numerous “intangibles” that are hard to measure but that still need to be taken into account when considering doing business in China. For example, there are the complications and ensuing confusion of communicating with a factory 7,000 miles away, in a different language. In the recession of 2008, one CEO who saw demand drop quickly told his plants in China to slow/stop production bound for the United States. However, that order wasn’t carried out because no one in the factory grasped what “slowing down” production entailed. Three months of additional inventory accumulated before the company realized that a massive amount of goods was coming to the United States and sitting in warehouses.

Another CEO and his wife were thrilled when his company stopped buying goods from China. The CEO no longer had to be on the phone every night after midnight with the management in China—and his wife was no longer woken up by calls from the plant at 2:00 a.m.

ALTERNATIVES TO CHINA RATHER THAN THE UNITED STATES

There are numerous reasons, financial and otherwise, for manufacturers to consider alternatives to China. However, there is no “sleeping giant” ready to displace the Middle Kingdom; reshored manufacturing will be spread out among various countries, with the United States being

one of them. Our admittedly very conservative estimate is that 10%–30% of production will be reshored to the United States.

CHESAPEAKE BAY CANDLE

The decision by Rockville, Maryland–based Chesapeake Bay Candle to open its first US factory in 2011 illustrates the limitations of alternatives to China. Chesapeake Bay Candle had shifted production of scented candles sold in stores such as Target and Kohl’s from China to Vietnam in 2002 in response to expected changes in US antidumping duties imposed on Chinese-made candles.

After Chesapeake Bay Candle opened a second factory in Vietnam in 2007, however, it found it increasingly hard to hire and retain skilled workers, who proved to be more transient than in China. Workers “would literally move from paycheck to paycheck,” recalls Chesapeake Bay Candle co-founder Mei Xu. The company therefore decided to shift to Maryland production of its scented filled candles, which are inserted in glass and other kinds of containers that lend themselves to automation. Chesapeake Bay Candle still produces handmade products in Vietnam and China, but it says that rising labor costs in those nations remain key challenges.

Vietnam

When businesses consider alternatives to China, Vietnam typically comes up as the first option. The Southeast Asian

country works well as a manufacturing base for low-tech, labor-intensive goods such as shoes, clothing, and accessories. But Vietnam has a small labor pool (the total population is around 92 million) and lacks sufficiently skilled workers for more sophisticated products such as electronics. Wages in Vietnam, though lower than those in China, are rising faster than in China, and frequent renegotiation (sometimes on a weekly basis) is needed to retain workers. When you factor in Vietnam's lower worker productivity, its cost advantages over China diminish or disappear.

In contrast to China, Vietnam has extremely poor infrastructure, an antiquated port system, and massive corruption. In our experience, a visit to Vietnam is all it takes for many overseas businesses to scuttle any plans to open plants there. They easily see that the country lacks China's advantages and quickly figure out that the true costs of doing business there aren't as low as they might seem.

India

With its success as an offshoring location for call centers and info tech services, and its status as the world's most heavily populated democracy, India may seem like a logical choice for offshoring other industries. Despite the large, well-educated population of English speakers that have turned it into a world power in IT and outsourced services, India is handicapped in its struggle to become the world's next big export manufacturing power by poor infrastructure, government inefficiency, and rigid labor laws.

India has virtually no highways, and its trains often travel at only 20 miles an hour. Much of India's governing is done on a regional basis—the country consists of 28 states and 7 union territories—which makes it difficult, if not impossible, to reach a consensus on countrywide issues affecting industry. Also, the state structure means that anytime a company needs to move physical goods from one state to another, it has to pay tariffs.

Indonesia

Indonesia is another name that is sometimes proposed as an offshoring possibility, as it has almost twice as many people as Vietnam. It is impractical for manufacturing, as it has a poorly trained workforce and is plagued by corruption problems and poor infrastructure.

South America, Central America, and Asia

El Salvador, Costa Rica, and parts of South America offer some potential for reshoring, because of their relative proximity to the United States and, in many cases, their excellent infrastructure. However, wages in those countries are already higher than they are in Asia, and the skilled workforce is not as large. Mexico offers low-cost manufacturing and quick, duty-free delivery to key US markets. We estimate it could capture as much as 25% of “reshored” manufacturing. However, its ability to absorb more than that percentage from China is limited by insufficient production capacity, too few suppliers or skilled workers, and rampant drug-related violence.

There is no easy solution to the critical flaws with Southeast Asia, India, South America, Central America, and Mexico.

Quite simply, no country has the wherewithal to replace China, with its immense pool of experienced skilled labor, its highly efficient infrastructure, and its ability to exercise tight control over its industry and people. The China of a decade ago offered the manufacturing world a low-cost package that included strong clusters, supply networks, worker training, and supportive policies on a scale and breadth that had never existed before and are unlikely to be seen again. No other low-cost nation can match the advantages of China's coastal provinces' container ports, electrical supply, or airports.

ADVANTAGE, USA

As companies ask themselves where they should move production, they should consider the United States as part of the answer. In the decade that saw China rise, humbled, hungry US manufacturers have become more efficient and cost-effective, thanks in part to automation and increased productivity, and the recognition that their survival depends on their ability to compete.

Much of the manufacturing capacity now coming online in the United States has a lower cost structure. New plants don't have long-tenured employees or the accompanying high legacy costs. These entry-level manufacturing jobs, which provide opportunity for advancement for many new employees, are being created at about twice the pace and at a substantial pay premium as many minimum-wage jobs in service industries, where the greatest job growth has long been predicted. Even the unions are recognizing that for job creation to occur and

survive, the wage structure has to be different for new employees. For example, the United Auto Workers agreed to let US automakers offer new workers a lower starting salary than they used to, decreased escalation with tenure, and less-bountiful benefit packages. This is a win-win: factories can stay open, and new workers are still earning much higher wages than they would in service industries, with better opportunity for career growth.

Wage pressures have also prompted US manufacturers to invest more in sophisticated machine tools and automated design software that allow them to produce goods faster, with fewer workers, and to accelerate new product development. In 2010 the US-manufactured value added was 235% of 1970 levels—and it was brought about with 33% less labor, which represents an extraordinary increase in productivity.

Simply put, the United States is making more products with fewer people. Yet these advances in automation and productivity have not killed job creation, as is commonly thought. In the past two years, some 300,000 new manufacturing jobs have been added—in lean, highly productive environments—further eroding China's advantage.

For example, ET Water Systems, which has been making irrigation-control systems in Shenzhen, Guangdong, China, since 2006, relocated production and assembly to Santa Clara, California (near San Jose), in early 2011. The company says not only is it faster—on a fully loaded basis—and cheaper to manufacture in San Jose than in China, but quality and yield have improved;

innovation and product development have accelerated; customer service and the overall user experience have been enhanced due to faster response times and direct shipping; and capital is deployed more efficiently.

Couldn't China regain its advantage by accelerating productivity? While productivity growth in China has been impressive, and is expected to increase 7%–8% a year between now and 2015, the gains aren't happening fast enough to tilt the scales back in China's favor.

Another common misperception is that Chinese factories could bridge the gap by installing the same automated tools that are used in the United States. However, China's competitive edge has been plentiful cheap labor. Installing more robots and thus reducing the labor content in a product undercuts that advantage—the very reason that companies outsourced products for US consumption to China in the first place. And if companies are relying on automation to produce goods for the US market, it makes sense to do so in the United States, thus dramatically reducing transportation costs and shortening the supply chain.

Finally, there is an economics-based argument for more localized manufacturing. All other factors being equal, or close, it makes sense to produce an item in the market in which it will be sold and consumed. Lower transportation costs are only one reason; another advantage to keeping production closer to end customers is that companies can bring innovative new products to market faster and respond to customers' changing tastes and demands more quickly.

Despite the challenges that China faces, it would be a mistake to think that it will cease to be a manufacturing power, especially as it has a rapidly growing domestic market that is four times the population of the United States. As companies that manufacture goods for export and consumption in the United States find alternatives to China, Chinese production capacity will increasingly be devoted to meeting domestic needs, fueled by a middle class that is growing by the millions each year. Even with recent numbers pointing to a slight cooling down, China remains one of the world's fastest-growing economies.

In addition, China will continue to remain a low-cost supplier to Western Europe. It will remain competitive in industries that have developed strong “clusters of excellence” and that have immense production capacity and large numbers of component and material suppliers.

Ironically, China's economic growth, fueled in large part by US companies having moved production there, will be a big factor in US companies bringing production back home. As China becomes more expensive, the United States becomes more attractive. When it comes time for additional manufacturing capacity, China will no longer be the easy, obvious choice. Companies will have to look at their entire supply network, and they may find the United States to be their best option.

The Pendulum Swings Back Toward the United States

For a long time the United States has had substantial trade deficits not only with China, but with Europe and Japan as well, exporting far less than it has been importing. This is about to change. With China, the reasons for the change are largely to do with that nation's economic growth, which make it a less attractive place to manufacture goods for the US market. With Europe and Japan, the change will come about because the United States has lower production costs and underutilized ports, making it an increasingly attractive place for manufacture and export.

The underlying economics set the stage for this shift, which will result from four distinct mechanisms: reshoring (production and jobs that went offshore, mostly to China, coming back to the United States); the United States' capturing export from elsewhere, particularly Western Europe; increased investment by foreign manufacturers to sell in the US market; and foreign manufacturers adding capacity so they can export from the United States.

RESHORING: THE SEVEN TIPPING POINT INDUSTRIES

The “tipping point” industries—those seven we identified as having both moderate labor content and moderate logistics costs—represent the biggest opportunity for reshoring for the United States and Mexico. The logic behind the tipping point is simple: If labor content is high and logistics costs low, production should be moved to where labor is cheaper (which, in almost all cases, won’t be the United States). If labor content is low, production will likely stay where it is. You ship only those goods that you can’t get in that location.

Our analysis indicates that by 2015, China’s manufacturing cost advantage at the factory gate in these seven industrial groups will drop below 10% instead of the 20%–30% that companies have been accustomed to. Taking into account shipping, duties, and other factors that make up the total cost of offshoring, many companies will conclude that it makes more economic sense to manufacture goods in the United States and Mexico for consumption in North America in the following industries:

- 1. Computers and electronics.** The United States imports from China around 26% of the electronics it consumes, led by computers, wireless phones, and televisions. US imports of these products from China in 2010 amounted to \$122 billion.
- 2. Home appliances and electrical equipment.** China supplies more than \$4.5 billion in lighting products and \$6.0 billion in small appliances such as fans, vacuum

cleaners, and microwave ovens each year. China also exports big appliances such as refrigerators, freezers, and dishwashers. US imports of these products from China in 2010: \$25 billion.

3. **Machinery.** Leading Chinese exports in this broad category include air conditioners, heaters, pumping equipment, office machinery, power tools, optical products, photocopiers, and farm equipment. US imports from China in 2010: \$16 billion.
4. **Furniture.** This industry, a traditional strength of southern US states such as Virginia and North and South Carolina, witnessed a surge in imports from China from 2001 through 2006. US imports from China in 2010: \$13 billion.
5. **Fabricated metals.** The array of metal products now made in China includes plumbing fixtures, hardware, hand tools, cutlery, and pots and pans. US imports from China in 2010: \$10 billion.
6. **Plastics and rubber.** Top Chinese exports to the United States include automotive components, floor coverings, and bottles. US imports from China in 2010: \$9 billion.
7. **Transportation goods.** China has become a major source of car and truck components, motorbikes, bicycles, and aircraft parts. US imports from China in 2010: \$6 billion.

Figure 3.1: “Tipping” industries account for ~\$2 trillion of US consumption and nearly \$200 billion¹ in imports from China

Industry category	Value of goods consumed ²	Imports from China
Transportation goods	~\$620B	~\$7B
Computers and electronics	~\$464B	~\$105B
Fabricated metals	~\$315B	~\$12B
Machinery	~\$240B	~\$15B
Plastics and rubber	~\$180B	~\$10B
Appliances and electrical equipment	~\$130B	~\$21B
Furniture	~\$80B	~\$14B

1. Total imports from China in 2009 ~\$300B; tipping point categories encompass 70% of total.

2. Goods consumed = Total production (intermediates & final goods) + Imports - Exports

Source: National Census Bureau, BEA, BCG analysis

In 2010 the United States imported around \$200 billion worth of products in these categories from China, which accounts for 55% of total Chinese exports to the United States. Altogether, these seven industries account for nearly \$2 trillion in annual US consumption.

Our conservative estimate is that production of 10%–30% of the goods in these categories will shift from China back to North America, with the United States getting the majority and Mexico the rest. Our estimate takes into account such factors as logistics costs and evolving supply and demand in the Chinese and US markets.

The amount of reshoring that comes to the United States will vary among these seven industries. For example, we believe the vast majority of computer and electronics manufacturing that moves from China will go to the United States, while Mexico will likely get a significant share of reshored transportation goods, given its inherent strength in that sector.

We also considered the portability of production. Some products will remain overseas because staying part of an established industrial cluster makes sense or because it would cost too much to build new capacity elsewhere. For example, the massive capital investments, scale, and experience of Asian companies in the flat panels used in computer and TV displays would significantly raise the barriers for entry for new US-based contenders.

Among the major companies already making the shift are NCR, which was manufacturing ATMs in China for US use, and is now making them in Columbus, Georgia; Ford, which has committed to adding 12,000 jobs in the United States; GE, which has added capacity to produce water heaters in its Louisville, Kentucky, plant; and Freeman Schwabe, which in 2009 reshored production of die-cutting presses and compression-molding machines from Taiwan.

FREEMAN SCHWABE

For Greg DeFisher, CEO of Cincinnati-based Freeman Schwabe, the decision to bring manufacturing back from Taiwan was about “controlling our own destiny.” Freeman Schwabe, which makes die-cutting

presses and compression-molding machines, moved engineering and manufacturing to Taiwan from the United States in 2002.

Like many other companies, Freeman Schwabe got caught up in the rush to China. “We had always been an American manufacturer, and we decided to offshore without really understanding the costs—or the unintended consequences,” DeFisher recalls. “An opportunity presented itself, and people thought it would be easy for us to lower our manufacturing costs and make a lot of money. We didn’t do a lot of analysis.”

DeFisher says there were not only quality problems after the move to Taiwan, but also customer resistance to the idea of buying products that were no longer made in the USA. “We had a lot of employees over there on a frequent basis, and then we also had to ask our customers to go to Taiwan,” he says. “They’re saying, ‘I’ve been buying your machines since 1935, and now they’re made in Taiwan?’ It caused a lot of ill will.”

In 2009, DeFisher decided he had had enough and was determined to bring engineering and manufacturing back to the United States. There was skepticism about the move among his own employees, many of whom thought DeFisher had “lost my mind,” he recalls. DeFisher told them to get on board—or find other jobs.

Three years later, DeFisher’s determination has paid off. US employment has tripled, warranty costs have gone down, and customer satisfaction has gone

up. That desire to be in charge of one's own destiny is paying off. "Because we are engineering and assembling the machine, if there is a quality issue, I can solve it better and more quickly," DeFisher says. "We were always responsible for problems, even if they weren't of our making. Now we feel a personal ownership and responsibility, which is more satisfying."

Freeman Schwabe can also get product to market more quickly. "We can win against China or Europe because we cut at least thirty days in transport alone. We just won an order against someone in Taiwan." That win is especially satisfying, because DeFisher knows he didn't win on acquisition costs. "If you looked at the actual product, ours is more expensive to buy but cheaper to own. When you consider ownership costs, maintenance costs, longevity, we come out ahead, because it's a better-built machine."

Now that it has reshored, the company is making more money than ever, but to DeFisher, that's only one benefit. "We brought back a sense of pride, of ownership. We're building morale, and skill sets. It's a really good, prideful feeling when you look out at the shop floor and see all the work that is happening."

Another consequence of the reshoring experience is DeFisher finds himself more conscious of buying things that are made in the USA. "I think folks are angry about the jobs that went offshore," he says. "People did it because they thought they were going to get rich. I am sure a lot of people did, but at what expense?"

We realize that our projections buck conventional wisdom. Even if costs rise in China, many contend, the United States is in a poor position to repatriate the work. It has been argued that years of outsourcing production and engineering work to Asia have so hollowed out America's manufacturing base, especially in high-tech products, that the United States no longer can competitively make even goods that were invented here, such as the Amazon Kindle or the Apple iPhone.

While a few industries have been hollowed out and are unlikely ever to return (such as clothing and footwear, as well as high-end electronics such as flat-panel TVs), most are still very much alive in the United States, as evidenced by the fact that the US manufactures more than 70% of what it consumes.

Chinese imports have hit the tipping point industries hard, but the United States still has the manufacturing base and the know-how to rejuvenate itself for most products in these categories, which have relatively modest labor content, higher-than-average logistics costs, and a reasonably broad supply base.

Recognizing that they must evolve or die, US manufacturers have made themselves cost-effective by investing in new equipment, lean manufacturing, and innovation. American workers have been forced to adjust as well, moving to where the jobs are and not expecting wages significantly higher than inflation. This combination of greater automation and streamlined manufacturing means that unit labor costs in the United States have effectively dropped in many of those industries.

For example, many US furniture factories closed in the past two decades amid a surge of exports from China, where huge facilities could produce wooden furniture for 30%–50% less than factories in the United States. China's cost advantage in this category was aided by government subsidies for this category, which the Chinese government has since eliminated. The costs of importing the raw materials to China and shipping bulky, heavy finished goods have further eroded China's cost advantage. US manufacturers are now finding it possible to deliver furniture made in the USA at a lower cost than that made in China.

FURNITURE

Bruce Cochrane, whose family has made furniture in North Carolina for six generations, witnessed firsthand the changing economics and mounting drawbacks of importing from China. Cochrane joined the stampede to China in the late 1990s. After his family sold Cochrane Furniture, he began helping other US companies source products in the mainland. Everywhere he traveled a decade ago in Chinese industrial districts, he saw job openings posted on factory gates, drawing hundreds of applicants. But by 2006, with China's manufacturing boom in full swing, factories were already having trouble filling positions. As wages rose, factory owners absorbed the higher costs rather than raise prices and risk losing business. Then many began running out of cash and were forced to shut down, leaving customers to scramble for new sources.

Now Cochrane is leading an American resurgence. Recently, he founded Lincolnton Furniture to produce medium- to high-end wooden bedroom and kitchen sets made of solid oak, maple, and cherry. The company is using a former Cochrane Furniture plant. Recruiting an experienced workforce was easy: the company received more than 1,200 applications for the first 75 jobs. “There is good, experienced labor now and a great willingness to work,” Cochrane told us. Local wages have barely changed in a decade, and in some cases they have gone down.

The manufacturing process, however, will be radically different, thanks to \$2.8 million in state-of-the-art woodworking machinery. When Cochrane made furniture a decade ago, converting a blueprint into a sample product for a retailer took around a month. Each round of alterations required a new physical prototype.

Lincolnton now can build and ship a finished sample in three or four days—something that would cost a fortune if made in China and sent by airfreight. A designer for a retail customer can submit a computer-aided design electronically to Lincolnton and quickly get back photo-realistic 3-D images of what the piece would look like in a variety of finishes. Design changes are done digitally. Once programmed, new tools can produce all the pieces of a prototype in minutes. Cochrane estimates that Lincolnton will be able to produce the same number of pieces with half the people it used to require.

These improvements give Lincolnton the flexibility to quickly fill orders for small batches of custom-designed furniture. “We don’t have a minimum order,” Cochrane says. “People can buy one piece if they want.” This capability also means that Lincolnton will have to keep little inventory: In the old days, Cochrane would stock millions of dollars in finished goods.

To get a sense of how the new manufacturing math will play out in the seven tipping point industries, we went to our clients and compared the actual costs of producing three different products in their factories in the United States and in China, in 2010 and 2015. Based on our assumptions about where wages will be in China in 2015, in each case, China’s cost advantage over the United States shrank dramatically by 2015.

A Plastic and Rubber Product

This is a plastic and rubber product for which China currently has a cost advantage over the United States. Given projected changes in wages and other costs, in 2015 it will cost only 1% more to make these products in the United States.

A number of factors favor building more capacity onshore. North American demand is projected to grow 30% between 2010 and 2017, an increase in sales that outstrips current US production capacity to service this region. Moreover, factories in China will still be required to supply the rapidly growing domestic market for this

product type. Demand in Asia is expected to grow by 5% annually through 2017, the fastest pace in the world, and by more than 50% by 2020.

If production costs were the only consideration, more production would be transferred from China to Mexico, where it would cost around 15% less. Yet we expect that 80%–90% of this product will go to the United States, adding 27,000 to 46,000 direct factory jobs, because of better logistics, more skilled workers for that industry, lower security risks, and other factors. Several prominent manufacturers have recently added production capacity or have announced plans to do so—the reshoring is already beginning.

A Kitchen Appliance

Take a kitchen appliance for which labor accounts for 20% of the cost. In 2005 the product's total labor cost per unit in a typical Chinese factory would have been 61% lower than that in the United States, and the cost before supply-chain expenses would have been about 21% lower, because of the productivity difference. By 2015, higher Chinese wages will have shrunk that total cost advantage at the manufacturing gate to 13%.

Again, this is before shipping, duties, inventory costs, and other expenses—the total cost of offshoring that we outlined in chapter 2. For this appliance intended for sale in the United States, the landed cost of the Chinese product will be higher than if the product were made domestically.

Upholstered Furniture

Furniture manufacturing has historically been a relatively low-capital-intensive business, as the work tends to be more manual and less automated compared with many other industries. “Cut and sew” steps consist primarily of workers and table-mounted sewing machines, and sofa assembly itself is low-tech, with workers using simple tools (such as hammers and springs) rather than complex machinery to assemble furniture.

Production of upholstered furniture occurs locally, which indicates that economics, lead time, customer satisfaction, and the high cost of shipping are more important considerations for manufacturers than being located in one of China’s industrial clusters.

The labor costs in China and Mexico for a sofa were very similar for 2010 and are projected to be similar in 2015. However, there was a big gap in 2010 between costs in the United States versus China or Mexico. Yet by 2015, labor costs in China (both direct and indirect labor) will have risen to a point where the United States will be a more attractive manufacturing option. Add in the increased transportation costs, and the US advantage over China grows even larger. Mexico is expected to remain the lowest-cost location for this product, so it will likely capture much of the production that leaves China.

MEXICO BENEFITS, TOO

That’s right: all the production leaving China will not come back to the United States. As you can see from the sofa example, Mexico already has and will retain its advantage

in certain areas, despite the disadvantages of producing there. Production of other items will move to other low-cost countries.

Also, there are items within each of the seven industry categories that have the characteristics that would likely be reshored, and others that don't. For example, when we refer to computers and electronics, we mean the finished goods, not the components. Semiconductors, a key component in electronics, have low labor costs, so you'd think they should be made in the United States. Yet semiconductors are so lightweight and have such a high value that you can put a million dollars' worth of them in a very small container and airfreight them for almost nothing. Therefore, as a percentage of the total cost, transportation is almost negligible, so it doesn't make sense to move production of them.

We believe that we are being conservative when we estimate that only between 10% and 30% of imported goods from China will be reshored to the United States. While our analysis indicates that sometime around 2015 the United States will become more cost-effective than China for products consumed in the United States, particularly those in the tipping point industries, we're pleasantly surprised that the shift to US manufacturing has already begun. We are seeing reshoring across a wide range of industries, among corporations big and small, and in many states across the country.

Reshoring is still in its infancy, yet we believe what we are already seeing is just the tip of the iceberg, a harbinger of what will prove to be an American manufacturing

renaissance, accelerated by a fundamental shift in the economics of production that is beginning to swing in America's favor—and will likely accelerate.

EXPORT

As bright as the picture is with regard to reshoring, it is even brighter for exports, both now and in the future. The total value of US exports has been growing at an average of 14% a year for the last two years. US export growth is significantly outpacing GDP growth, and US exports as a percentage of GDP are at their highest point in the last 50 years. Among the major developed economies, the United States is becoming the “low-cost country” for manufacturing, thanks to cost advantages for labor and energy. And because the United States had such a large trade deficit with Asia and Europe, back-haul pricing for containers remains very low, which will give the United States lower effective shipping costs for at least a while.

By 2015, productivity-adjusted labor costs are projected to be significantly below those in other major developed manufacturing economies. We project that by 2015, productivity-adjusted wages will be 27% higher in the United Kingdom, 50% higher in Germany, 54% higher in France, and 75% higher in Japan than in the United States.

New technologies to extract low-cost natural gas, assuming they are not harmful to the environment, also give the United States a major energy cost advantage that is likely to persist throughout this decade. Natural gas prices are 90% higher in the United Kingdom, 180%

higher in France, 190% higher in Germany, and 240% higher in Japan than in the United States. Industrial electricity prices are 150% higher in France, 180% higher in the United Kingdom, 100% higher in Germany, and 150% higher in Japan than in the United States.

This means that for companies with high energy consumption rates, US manufacturing will be substantially advantaged. For companies with moderate levels of energy consumption, manufacturing in the United States could mean a 1%–2% cost advantage over the rest of the developed world. While a 1%–2% total cost advantage may seem small, it could have a significant impact on a company's bottom line.

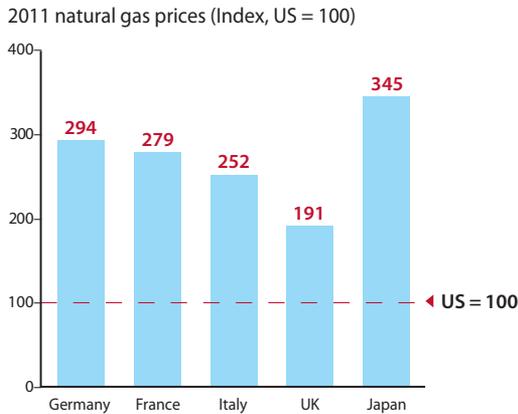
Total manufactured costs are 15% higher in France and Germany, and 21% higher in Japan.

Because the United States has major trade deficits with China, Japan, and Europe, far more goods are being shipped to the United States than are being shipped from the United States. While the ships are coming to the United States at almost full capacity, they return only 54% full. As a result, shipping companies are pricing the cost of containers leaving the United States at relatively low levels.

All these factors give the United States a significant export cost advantage over other major developed economies in a variety of traded product categories, including machinery, transportation equipment, chemicals, metals, textiles, and electrical equipment. The advantage in chemicals is particularly high: US prices for natural gas and feedstock for chemical manufacturing are a third of world prices.

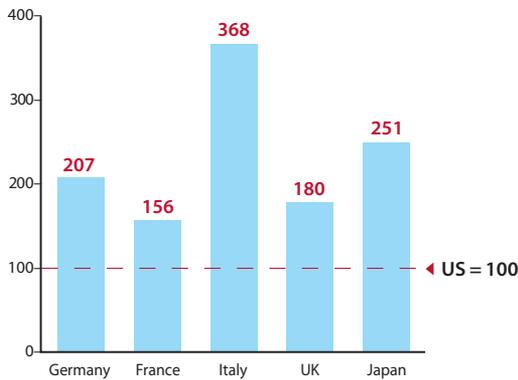
Figure 3.2: Abundant natural gas in the United States has led to a large energy cost advantage for domestic manufacturers

Natural gas prices in other major manufacturing economies are around 2–3.5 times higher than in the US ...



... and industrial electricity prices are around 1.6–3.7 times higher

2011 industrial electricity prices (Index, US = 100)



Note: Energy prices based on 2011 averages.
 Source: IEA quarterly energy price and tax statistics, BCG analysis

THE US EXPORT CAPTURE

Due to increasing US competitiveness, the United States is expected to capture between 2% and 4% of total Western Europe exports—meaning that manufacturing that would have occurred there will instead happen in the United States. In certain sectors, such as chemicals, where energy and feedstock costs are natural-gas-based, the capture could be as much as 10%. The potential US capture from Japan is even greater, estimated at 3%–7% of total Japanese exports. It is also worth noting that these areas where the United States is expected to capture export go beyond the tipping point industries, to include chemicals, fabricated metals, and textiles.

INVESTMENT BY FOREIGN MANUFACTURERS IN THE UNITED STATES TO SELL IN THE US MARKET

The trend toward manufacturing in the end market is one key reason foreign manufacturers will invest in the United States. In early July, Airbus announced it would spend \$600 million building jetliners in Alabama. The company is doing so to increase market share in the United States and as a hedge against currency fluctuations. Jetliners are sold in dollars around the world, but most of the manufacturing costs are currently in euros. Airbus plans to start building the new facility in 2015 and to produce some 50 planes a year by 2018.

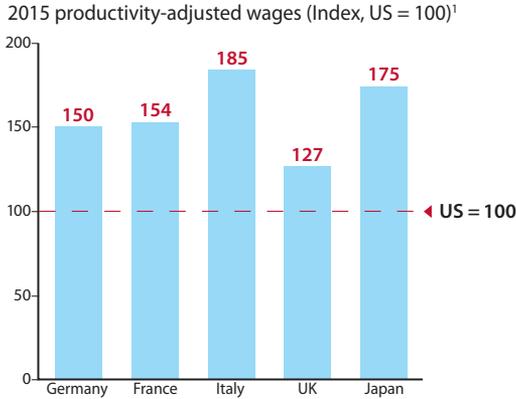
In 2011, ZF Wind Power opened a plant in Gainesville, Georgia, at which it produces wind turbine gearboxes. The Friedrichshafen, Germany-based corporation will

sell some of those gearboxes to Vestas for its Colorado wind turbine plant. “This opening represents a \$98 million investment in construction and manufacturing equipment,” Elizabeth Umberson, president of ZF Wind Power, told the *Gainesville Times*. The new venture provides jobs for more than 150 people.

Volkswagen has opened a \$1 billion factory in Chattanooga, Tennessee; French automotive parts supplier Faurecia recently opened a 180,000-square-foot plant in Madison, Mississippi, to supply a nearby Nissan factory; and Mitsubishi Nuclear Energy Systems, which builds nuclear power plants and components, is constructing an engineering center in Charlotte, North Carolina, a city traditionally known as a banking hub.

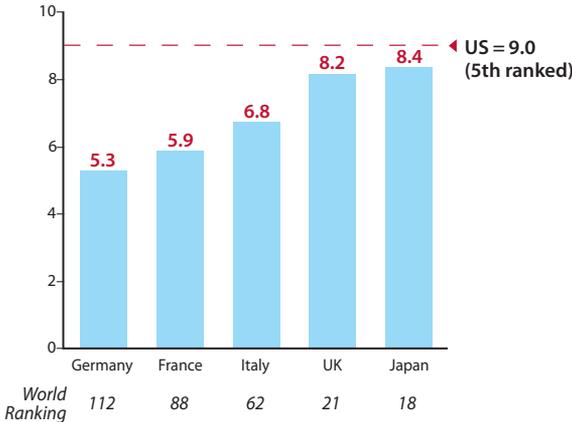
Figure 3.3: US labor market is the most attractive of all major developed-world manufacturers

Labor costs in other major manufacturing economies are 1.3-1.9 times higher than in the United States ...



... and the US benefits from comparatively flexible labor market

Overall labor market regulation rating (Max = 10)



Note: Fully loaded wages from EIU. US wages are average for lower-cost states.
 1. Productivity indexed to US productivity, projected from 2010–2015

Source: ILO, EIU, 2011 Fraser Institute Economic Freedom ratings, BCG analysis

EXPANSION OF PRODUCTION BY FOREIGN MANUFACTURERS TO EXPORT FROM THE UNITED STATES

Finally, we expect expansion of production by foreign manufacturers, who see the United States as an increasingly cost-effective export base for the rest of the world, including Western Europe. These companies—some of whom originally came to produce products in the United States for sale here, such as Toyota—will find the United States an attractive export base for many of the same reasons that US companies are capturing export from Europe and Japan.

Quintessentially British Rolls-Royce cited competitiveness as a reason for breaking ground in 2009 on a new Crosspointe, Virginia, facility that will eventually provide jobs for 600 people. Rolls-Royce has invested \$1 billion in the United States in the last decade and employs 7,700 people in “advanced manufacturing” positions across the country. It will “continue to invest for future growth across the region,” according to a company spokesman. Products the company either manufactures or tests (or both) in the United States include civil and military aircraft, gas turbine engines and components, and marine propulsion and shoplift systems

Foreign automakers are increasingly using the United States as an export platform, with Toyota, Honda, and Nissan all adding manufacturing capacity in the United States and planning to export more of their output. For example, late last year, Toyota announced it would export to South Korea Camry sedans assembled in Kentucky and

Sienna minivans made in Indiana. The carmaker also has suggested it will ship US-made cars to China and Russia. At the Detroit auto show, Yoshimi Inaba, the president of Toyota Motor North America, said that “this is just the beginning of a new era of North America being a source of supply to many parts of the world.” And BMW is making its 7 series SUVs in the United States.

CHINA STARTS “MAKING IT IN AMERICA”

If the trend toward American companies’ bringing manufacturing operations back home from China comes as a relief for the United States and its troubled job market, count the opening of US plants by Chinese corporations as a wonderful surprise—a development few economists would have predicted a few years ago, after US lawmakers’ rejection of a Chinese company’s bid to buy Unocal in 2005 left a bit of sourness between the two countries.

SANY, a Changsha, China-based company that produces construction industry products such as concrete machinery and cranes, has opened a factory in Alabama as part of its overseas investment strategy.

So if China tends to produce small things such as toys and electronics for the United States, why is the Middle Kingdom so keen on making heavy equipment and construction supplies in the United States? For one, many of these products ultimately are sold to US businesses, so relocation cuts out the gargantuan costs of shipping them from China.

Lenovo, a \$30 billion global personal technology company—and one of the top two PC makers worldwide—announced in early October that it would start PC manufacturing in a North Carolina facility in 2013. “Having a [production] facility here in a home country is a differentiator that people will value,” Lenovo North America president David Schmooch said in the *Wall Street Journal* on October 2. He acknowledged that costs will be higher, but believes the attractiveness of having a product made in the United States will compensate for the higher price tag, and he drew an analogy to companies’ sustainability initiatives. “Being green is not necessarily the lowest-cost option for a lot of companies, but you do it because your customers and partners value you being green,” Schmooch told the *Journal*.

Chinese companies can pick up new skills as well as new revenue by looking beyond their borders for factory sites. It’s an opportunity to “augment managerial skills and staffing to remain globally competitive,” according to *China Business Review* columnists Daniel H. Rosen and Thilo Hanemann. They also note that the United States can expect a greater share of the \$1 billion to \$2 billion China is expected to spend on outward foreign investment over the next decade, as the Asian country shifts more of its investments from developing world to developed.

And those Chinese investors will likely see less reluctance from the US lawmakers who must approve the deals. “The Committee on Foreign Investment in

the United States (CFIUS), which screens investments for national security risks, has cleared the vast majority of Chinese proposals, among them acquisitions in sensitive sectors, such as power generation, shale gas development, and aviation,” Rosen and Hanemann report.

A NATIONWIDE PHENOMENON

We are seeing companies open facilities in places we never expected, such as California and the Pacific Northwest. These days, choosing a location for manufacturing is about where there’s a flexible workforce, where it makes sense to produce given the rest of the supply chain, and what incentives local governments can supply (an issue we will look at in the next chapter).

We estimate that, by the end of the decade, there is the reasonable potential for \$100 billion to \$150 billion due to reshoring and increased exports beyond the natural trade growth. This figure includes the capture of 2%–7% of exports from major developed export economies (France, Germany, Italy, Japan, and the United Kingdom) and an up to 3% increase in growth of exports to the rest of the world from the United States.

Companies must be smart about how they approach this paradigm shift, however. Just as many rushed into China, they should not now rush out of China just because wages are rising and the renminbi is appreciating against the dollar. China and the rest of Asia still will hold some of the world’s biggest growth opportunities well into the future, so companies should consider devoting more of

their capacity there to serving those markets. And in some industries, China will remain a cost-competitive place to manufacture for US companies, regardless of where products will be sold.

NCR, Lincolnton, Farouk, Rolls-Royce, and Airbus are in the vanguard of an important trend that we expect only to grow. If they have not done so already, it is time for companies—especially those in tipping point industries—to reassess their global manufacturing footprints. Those that continue to treat China as the default low-cost option for supplying US markets on the basis of lower wage rates alone could soon find themselves at a competitive disadvantage.

The manufacturing shift from reshoring, export capture, and increased investment in the United States to sell either here or abroad will create between 700,000 to and 1.3 million direct manufacturing jobs. With each direct job indirectly creating three additional jobs in such areas as construction, retail, transportation, food services, and housing, we are looking at between 2.5 million and 5.0 million total jobs being created. In turn, unemployment would be reduced by two to three percentage points.

Based upon what we've seen, we believe these estimates are conservative.

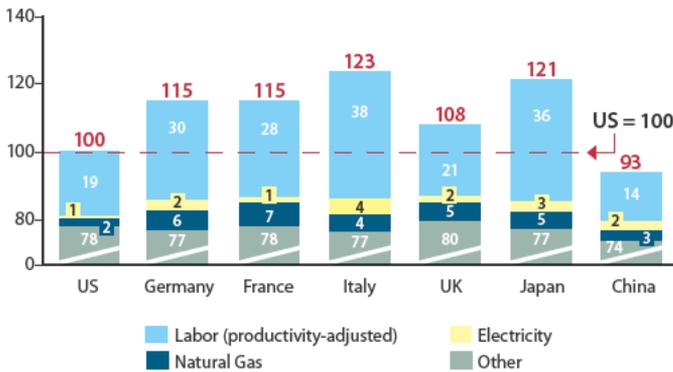
BEYOND JUST COSTS—NCR

The desire to be closer to the user motivated NCR's decision to make all ATMs sold in North America in its own “innovative manufacturing” facility in Columbus, Georgia—close to its design and customer

Figure 3.4: Labor and energy cost advantages will position the United States as one of the developed world's lower-cost countries

Major exporting nation average manufacturing cost structures relative to United States (2015 projections)

Manufacturing cost index (U S = 100)



Note: No difference assumed in "other" costs (e.g., raw materials inputs, machine and tool depreciation). Differences in values a function of the industry mix of each export country.

Cost structures calculated as a weighted average across all industries:

1. US figures represent costs in a set of select lower-cost states as defined in prior publications.
2. Chinese figures represent Yangtze River Delta region.

Source: US Economic Census, BLS, BEA, ILO

service centers in metropolitan Atlanta. Previously, NCR used a contract manufacturer and its own manufacturing facilities in China, India, and Hungary to make North American ATMs. NCR has since also moved to Georgia production of its highly successful line of self-check-out systems for its North America customers used in retail stores. The company still has

“innovation hubs” and plants that design and build solutions in Beijing for sale in Asia, in Brazil for South America, in Hungary for Europe, and in India for the domestic market and Southeast Asia—a total of five plants around the world. Not only are there cost advantages to this, but also the company wants to be closer to the customer.

Locating manufacturing close to its design and customer service operations has enabled NCR to collaborate more efficiently with suppliers and large financial services and retail customers to custom-develop machines with innovative solutions for local markets, said Peter Dorsman, NCR’s executive vice president and chief quality officer. NCR ATMs deployed in Brazil, for example, have advanced security features, including safes that can withstand powerful explosives used by the robbers who strike ATMs on a nearly daily basis in that country. ATMs in the hypercompetitive United States, where cash machines are ubiquitous, have distinct features such as envelope-free deposits that allow consumers to insert both bank notes and checks through a single slot in the same transaction. This sets NCR ATMs apart from the machines of competing banks that may have ATMs on the same city block.

The company has reduced by around half the cycle times from design to production, which could take two years for its most sophisticated products. “The beauty is that we have had a dramatic impact on time to market, reducing cost, and inefficiency,”

Dorsman explained. “This is allowing us to be more cost-competitive.” It also reduces product lead times by virtue of [our] not having finished goods on the ocean for a month.

Succeeding in the Manufacturing Renaissance

The impact of rapid cost-structure shifts between China and the United States is likely to be profound—both for the US manufacturing sector and for companies that source their products globally. Manufacturers, suppliers, and retailers must approach this potential paradigm shift carefully and intelligently, however. Not long ago, too many companies rushed to China, spellbound by its cheap labor and fixed currency. Now, though wages are rising and the yuan is appreciating against the dollar, they must avoid a wholesale withdrawal.

Instead, they must work toward a holistic, global, and long-term understanding of the total costs of making specific products for particular markets and the economic trends that will influence future costs. They must also consider whether they have sufficient and appropriately located manufacturing capacity and a nimble enough supply chain, and how they will ensure a supply of skilled workers. Retailers have to think about whether they have relationships that will help them keep costs low

(e.g., with local suppliers) to achieve maximum profitability for their products.

And while we believe that the responsibility to meet all these needs falls largely on the private sector, as befits a market-based economy, the public sector must play a part as well. And when appropriate, the two must work together.

MANUFACTURERS

In addition to “doing the math,” as we talk about in chapter 2, all but the smallest manufacturers need to assess the potential market for their products, in terms not just of demand but also geography. For many manufacturers serving the United States in the tipping point industries, it will make more economic sense to manufacture outside of China. These manufacturers must look at their options and network and then balance risks, costs, and local market needs. Assessment should include worker productivity in different countries, labor as a share of total costs, the relative importance of logistics, and the myriad hidden costs and risks of operating extended global supply chains. Companies need to ask, “How is this going to evolve over the next ten years? And if it continues to go in that direction, should I be focusing more capacity in the United States? Will the spread get narrower and even cross over at some point?” Of course, no one knows how the United States will look in 5 to 10 years, but you need to stay on top of trends and make educated judgment calls. You probably don’t want to bet entirely on either the United States or China or any other country. You need some

diversity of location as a hedge, and to figure out how best to balance global scale and costs with the value of lower transportation costs and being close to the customer—all in a world with rapidly changing cost structures.

Finally, companies should determine how they can redeploy their Chinese production lines to supply China's and other Asian nations' growing domestic markets. Demand in China has been growing at 7%–12% a year. Foreign companies that have seen the advantages of expanding their manufacturing platforms in the United States rather than in their home countries due to the favorability of production economics in the United States—Rolls-Royce and Toyota, for example—should ask themselves similar questions about doing business in China. The decision these businesses make will likely affect their competitiveness for the next two or three decades.

RETHINKING THE SUPPLY CHAINS

Companies should build flexibility and diversity into their supply chains, to give them the leeway to shift production and sourcing to other locations when the time is right. And they should weigh the many intrinsic advantages of locating manufacturing close to consumers, such as the ability to get products into the hands of customers more quickly, replace depleted inventory of popular items, and make design changes in response to market trends or customer demands.

There are four types of flexibility that are critical to preparing for the future:

- **Intelligence**—the ability to look over the horizon and see what is happening;
- **Options**—a dedication to consider all your options and keep some open so you can deal with changes;
- **Speed**—the ability to react quickly as opportunities appear and to reduce risks when they become apparent;
- **Hedges**—the capacity to hedge your positions to avoid unnecessary risk.

The winners are building flexibility into their supply chains now. Google uses prediction markets to identify delays early, enabling quick response. Toys R Us is among the retailers using pop-up stores at the holidays to capture surge in demand at low cost. Spanish clothing retailer Zara has relied on speed-based supply to allow it to be more responsive to changing demand. And P&G has redundancy in US manufacturing capability as a hedge against logistics problems and other holdups.

Adding flexibility often involves a short-term trade-off of higher unit costs. But in a dynamic world where long-held assumptions may no longer be valid, flexibility is needed. And when handled appropriately, flexibility and lower costs don't have to be mutually exclusive.

The Outdoor GreatRoom is one company that has shifted production to reap the benefits of a reduced supply chain, which range from greater flexibility to lower costs. The company cited the inconvenience of having to book orders from Chinese contractors nine months in advance

as a reason for moving production of its fire pits and outdoor shelters from China to the United States.

Houston-based Farouk Systems moved some assembly of its hair irons and dryers from South Korea and China to Houston in 2010 to reduce inventory costs and address counterfeiting. Since that time, the company has experienced significant growth. Its assembly warehouse now runs more efficiently, and production has increased by nearly 40%. Farouk Systems Inc. has implemented lean manufacturing practices to create a safe and productive work environment for its employees.

RETAILERS

While we believe it will be several years before the reshoring movement truly takes hold, retailers, too, must start thinking about the implications for them. If you're a big-box retailer, for example, there are numerous issues to consider. If prices suddenly go up in China, where and how will you source? Will you have to ride a substantial price increase for a significant period on all the goods you buy from China? Can you pass those price hikes on to customers? Or do you find US manufacturers? And do those manufacturers even exist anymore, or did they all go out of business when you started sourcing from China? As wage increases drive up prices for goods made in China, products will reach tipping points where the price to manufacture in the United States will be lower than in China. We are already seeing this in home building products as basic as nails. The prices for nails made in the

United States are often lower than for those made in China. Retailers may put themselves at a disadvantage if they continue to source in China, and could find themselves “locked out” from getting better-value, Made in America (MIA) products. Additionally, since most Americans are willing to pay at least a slight price premium for MIA products, the tipping point may come sooner for consumers, so if a retailer does not have access to MIA goods, it will lose share or need to discount the non-MIA products to get them to sell.

If you are a retailer who currently does contract manufacturing in China, if you don’t have a supply base within the United States, you will likely be disadvantaged in the second half of the decade. You need to make sure your manufacturers can make their products in America. They need either to develop relationships with existing manufacturers and help them expand their businesses (even if they’re not using them yet) or even help new suppliers develop. This is especially important in categories such as children’s toys, where safety is a genuine concern and of paramount importance and, therefore, commands a significant price premium.

THE SKILLS GAP: NOT A CRISIS TODAY, BUT A GROWING CONCERN

All companies that have a stake in successful reshoring (manufacturers, suppliers, and retailers) have a vested interest in making sure there are workers with the skills to fill the jobs that will be coming back to the United States. Opinions vary widely as to whether the United States

actually has a skills gap. Some say the number of jobs that can't be filled because of a lack of qualified workers is as high as 600,000. Here are the extremes in opinion:

“If I could fill those positions [with qualified workers],” Drew Greenblatt, president of Baltimore-based Marlin Steel Wire Products told the *Financial Times*, “I could raise our annual revenues from \$5 million to \$7 million.” The other point of view, underscored by the high unemployment numbers, is that the supply of workers far exceeds demand. Said Peter Cappelli, professor of management at Wharton, in the *Financial Times*, “The skills gap is largely a figment of companies’ imagination... They cannot find workers to do the very specific tasks they want done. That is different from not being able to find capable workers.”

The Center for Economic and Policy Research puts it more starkly, and harshly: “The data make it clear that the problem is simply incompetent managers...the way to get more workers is to offer higher wages...this clearly is not happening in the manufacturing sector.”

Of course, the truth lies somewhere in the middle. At the national level, the key indicators of a skills gap (excessive wage growth, a high vacancy rate, and high levels of overtime) are not apparent. Only about 1.4 million—approximately 10% of the total manufacturing workforce—is classified as high-skill. And while there are companies having difficulty filling specific jobs in specific locations, we find that a lot of skills-gap complaints fall along the lines of “I can't find people to do this job for twelve dollars an hour.” You can't expect to pay minimum

Figure 4.1: High-skilled manufacturing labor clustered into relatively few occupations

SOC Code ¹	Manufacturing occupations that are high-skilled	2010 employee count (K)	% of total
51-4041	Machinists	280	21%
51-4121	Welders, cutters, solderers, and brazers	203	15%
49-9041	Industrial machinery mechanics	158	12%
17-2112	Industrial engineers	141	10%
51-4011	Computer-controlled machine tool operators	121	9%
11-3051	Industrial production managers	118	9%
51-4111	Tool and die makers	65	5%
17-3026	Industrial engineering technicians	47	3%
51-8091	Chemical plant and system operators	42	3%
17-3013	Mechanical drafters	37	3%
	13 other high-skilled occupations	143	11%
Total high-skilled mfg employment		1,353	100%

1. Standard occupational classification
 Source: BLS, BCG analysis

wage or only slightly above it for skilled work; nor should you think you won't have to train workers. Yet because of high unemployment, many companies have unrealistic expectations about the supply of qualified workers—and what they can pay them. Enlightened employers recognize that the economics have not changed; they need to pay quality workers market-competitive wages and train them.

Based on BCG analysis, the size of the supply-and-demand imbalance due to a skills gap in the United States is less than 1% (80,000 to 100,000) of 11.5 million people in

manufacturing jobs. We don't consider those numbers to be high enough to be a barrier to manufacturing returning to the United States. The skills gap in the United States is probably on par with that of Germany or Japan. In fact, in a recent BCG survey, a majority of respondents reported moving production to rather than from the United States to access skilled labor.

But what of those 80,000 to 100,000 jobs for which there is a skills gap? Private enterprise and governments can address this gap via several levers—and address it they must. While there may be only five or six job categories where a genuine gap exists (e.g., welders), the gap will increase in size and scope as more manufacturing jobs are created in the United States.

The United States mustn't become complacent. If it doesn't address the skills gap, that gap will only get larger, and jobs will be even more difficult to fill as skilled workers age out of their positions. For example, the average age of a welder is 56. If new people aren't trained, who will fill those vacated jobs? The United States must promote manufacturing as an attractive career, produce qualified workers through relevant training, and make it easier for employers to find qualified workers.

The first and most basic lever is education. From K through 12, schools need to do a better job of teaching man-ufacturing-critical skills such as math and problem-solving. They must consider these as vital parts of the curriculum alongside reading and writing. High schools once again need to offer machine shop classes, and to rebrand manufacturing as a viable and sustainable career.

One institution accomplishing just this is the Austin Polytechnical Academy, a partnership between the Chicago Public Schools and local manufacturers.

AUSTIN POLYTECHNICAL ACADEMY

Now that more American manufacturing is returning home and Chinese companies are expected to open more US plants, qualified English-speaking employees with science, technology, engineering, and math skills, also known as STEM, will be in ever-greater demand. Austin Polytechnical Academy wants to ensure that these prospective employers will have an ample supply of candidates from Chicago's West Side. The school's mission? "To educate the next generation of leaders in advanced manufacturing." This means that, along with social studies, kids can learn what kind of lubricant to use for an index machine and how to insert a chuck.

Created by the Chicago Manufacturing Renaissance Council in 2007, the college- and career-prep public school has the help of 65 manufacturing partners—among them such roll-up-your-sleeves outfits as American Grinding and Machine Company, Columbia Metal Spinning, and DeCardy Die Casting—who provide the students with field trips, work experience, and mentoring.

"The baseline is having a high school diploma, but in a lot of ways, that really doesn't mean anything as far as basic skills," Erica Swinney, director of career and community programs at Austin Polytechnical,

explained to PBS News. “Our students get the chance to earn nationally recognized credentials in machining.”

The academy offers three to four years of college-prep engineering classes and requires students to take at least one National Institute for Metalworking Skills (NIMS) machining course. After graduation, students who prefer not to stay in the Windy City will likely have plenty of other options.

Municipal and state programs that work with employers to fill high-skill jobs take education to the next level. These programs often involve partnerships with vocational schools to provide in-classroom training. Quick Start (Technical College System of Georgia) and ManufacturingWorks (Chicago Workforce Center) are excellent examples of how businesses, educational institutions, and government can work together. Georgia’s commitment to subsidize job training for start-up plants as part of its economic development package gives it an advantage over other states when companies assess where to build new plants.

Additionally, companies need to show a commitment to on-the-job training. We have seen consortiums that share financial costs to teach postsecondary students manufacturing skills, such as the Commonwealth Center for Advanced Manufacturing (CCAM) in Virginia. Rolls-Royce, an organizing industry member of CCAM, employs more than 7,700 people in advanced manufacturing jobs across the United States and has invested more than

\$1 billion in the nation over the past decade. It also donated the 20 acres of land on which the CCAM is built.

In a March 2012 speech at Rolls-Royce's Petersburg, Virginia, location, President Barack Obama praised the carmaker for creating 200 jobs there and discussed the importance of advanced manufacturing in the US recovery from the 2008 financial crisis. Of CCAM, set to open soon thereafter, the president said, "Think of this as a place where companies can share access to cutting-edge capabilities...and [where] workers...are training on state-of-the-art equipment; they're solving some of the most important challenges facing our manufacturers."

Overall, we see the skills gap as an issue, not a crisis. While some shortages of skilled workers exist in specific markets, there is currently no nationwide shortage of skilled workers. However, especially due to the aging of our skilled workforce and the expansion of manufacturing jobs, steps must be taken to ensure that it doesn't become a crisis or a reason for companies to decide against manufacturing in the United States.

What Government Can Do to Accelerate the Renaissance

While we believe it is primarily the role of the private sector to enable the recovery, there are steps the government should take to help. Job creation is not a partisan issue: it should be a cornerstone of public policy, period. By the end of this decade, we estimate that the reshoring of manufacturing from China and increased exports could create 2.5 million to 5.0 million new jobs. The United States is becoming an increasingly cost-effective option for supplying the developed world, and this trend could accelerate if federal, state, and local governments take the appropriate actions.

Governments in Asia and Europe have used generous financial incentives to persuade multinational companies to build high-tech plants in targeted industries. Frequently they've offered terms that the US government would not match, such as cash grants, cheap loans, and 10-year holidays from corporate taxes. In recent years, however, the US federal government and many states have partially

closed the gap with aggressive incentive packages, making the United States more competitive in the chase for manufacturing facilities.

We recommend 12 policy actions that the United States should take to accelerate manufacturing growth on its shores.

1. Launch a public information campaign to inform business leaders of the benefits of manufacturing in the United States.

Federal government officials should create a targeted public education campaign encouraging manufacturers to stop thinking about China as the default option and to consider the global supply chain, including the United States, especially for production serving the American market. Unfortunately, companies often neglect to conduct full economic analyses of critical business decisions, instead following perceived (and often outdated) trends they see in the market.

2. Provide an online financial tool for companies to calculate their reshoring opportunity.

Just as online finance calculators have increased the financial literacy of American consumers and encouraged them to examine more closely the long-term effects and total costs of their spending decisions, a financial tool for manufacturers would encourage firms to look beyond the current allure of Chinese and other “low-cost” country production, to the mid- and long-term savings prospects of US production. (An excellent resource to help smaller

and medium-size firms evaluate this already exists, the Reshoring Initiative at [www.reshorennow.org/.](http://www.reshorennow.org/))

3. Create hybrid educational programs with a mix of college and vocational education and training to increase the number of skilled workers—with a focus on targeted sectors of the economy.

State or local governments should partner with manufacturers to offer students the opportunity to learn foundational vocational skills while also taking practical college-level classes such as engineering and business administration. A hybrid educational stream would produce more technically proficient machinists, welders, and electricians to fill increasingly complex manufacturing jobs. Such programs could also produce more business-savvy entrepreneurs and manufacturers. Why couldn't a four-year college require that students devote half their time to liberal arts and the other half to a trade, such as welding, plumbing, or manufacturing computer technology?

4. Provide special federal student aid terms or loan forgiveness for training in relevant technical and vocational skill areas.

With young adults taking on increasingly greater student loan debt, such programs would provide an incentive for students to enter technical and vocational skill areas relevant to manufacturers.

Existing programs that encourage students with federal loans to enter relatively low-paying but important

public service jobs to receive loan forgiveness, such as the federal Public Service Loan Forgiveness (PSLF) program, demonstrate the potential success of this concept. It would also provide incentive for older workers, who are often hesitant to assume new debt that additional education or training entails.

5. Appropriately fund state-based programs to provide job (re)training for new employees when manufacturing plants are expanded or built.

While there is no major skills gap now, companies still need to train workers for new positions in factories, especially in technologically sophisticated manufacturing.

The federal government should support state-based programs that combine government means of support (e.g., relocation support or unemployment benefits during training) and synergistic collaborative efforts with potential employers and local vocational schools, extension schools, community colleges, and school districts.

The US government has already committed approximately \$9 billion to assist states with retraining programs, but more can be done. A renewed focus on close partnerships with key stakeholders and more effectively administered funding could encourage manufacturing expansion and reshoring by reducing uncertainty about the skilled labor pool.

6. Enact financial incentives such as tax breaks and tax credits.

State and local governments have long used tax breaks to

encourage firms to build new manufacturing plants. The increased employment and follow-on effect of attracting other manufacturers often merits the loss in revenue.

While it must take care not to favor one state or city over another, the US government can use federal tax incentives selectively and strategically to promote the expansion of manufacturing in the United States. Tax credits that target key technologies, industries, and geographies (within defined parameters) would provide useful incentives to companies to reshore production. The federal government also needs to add some stability to the tax laws. Too much regulation is on again, off again, or has expirations built in that don't allow companies to make long-term plans.

The federal government could encourage manufacturers to reshore their production also by reestablishing immediate depreciation of necessary capital investments. Tying this 100% expensing policy to reshoring or focusing on key technologies, industries, and geographies would provide a powerful incentive.

The United States needs to adjust its tax policy to favor insourcing rather than outsourcing. This means lowering the corporate tax rate, cutting loopholes, and providing a targeted tax credit for job creation in the United States. Also the government should create a dollar-for-dollar tax credit for repatriation of funds to the United States as long as all that money goes toward creating jobs in the United States. While tax reform is complicated, if done correctly, it could be a real boon for US manufacturing.

7. Attract and enhance “manufacturing clusters.”

Many companies that could reshore their production remain overseas because of strong established manufacturing clusters that don't currently exist in the United States. By focusing on promoting investments, technologies, and workforce skills-building in targeted geographies, the US government could accelerate the reshoring of production in the tipping point industries. An example is CCAM, which is producing high-tech aviation parts in south and southwest Virginia.

An effort coordinated by the federal government involving potential employers, colleges and universities, vocational training centers, local governments, and other key stakeholders would create an ecosystem to supply a tipping point industry. This ecosystem approach would increase the investment pool, encouraging the formation of supply chain clusters. The Commerce Department's Economic Development Administration, by broadening its mission beyond economically disadvantaged areas, could assume the federal coordination role and enhance this approach by facilitating a cohesive package of investments and grants.

8. Enhance US Department of Commerce programs and capabilities that benefit US manufacturers.

As labor-intensive manufacturing shifted overseas and remaining US production harnessed new technology to become more efficient, the US Department of Commerce struggled to advance two primary missions: promoting US exports and encouraging investment in the United States.

The department's International Trade Administration (ITA) and ITA's US Commercial Service assist thousands of US companies in their traditional role as trade promoters. As the economics of manufacturing production change, however, the US Commercial Service's charter and resource allocation must keep pace, and the Service must expand its authority to include guiding direct investments by global firms and shifting priorities and resources quickly, both in the United States and overseas.

Encouraging increased domestic and foreign direct investment requires an enhancement of current efforts. Commerce's SelectUSA website should be transformed from a showcase for prospective investors into an interactive Web-based tool that enables investor decision making, connects US suppliers and downstream manufacturers, and promotes exports.

9. Develop a more intelligent, targeted immigration policy.

The immigration process for temporary workers in specialty occupations, utilizing a system of yearly statutory caps, is antiquated, failing to adapt to modern business practices. A dynamic system that responds to strategic and market pressures for foreign talent, allocating the necessary number of required H-1B visas to those with desired skill sets or within key industries, would reduce uncertainty for US firms and allow the nation to benefit from foreign talent in key occupations.

An uncapped, rolling visa process, informed by market needs, would remove the arbitrary nature of the

current cap system but still allow the US government ultimately to determine its immigration policy.

Even after increasing the US skilled labor pool through advanced vocational training programs, manufacturers will still need to fill many advanced technical positions requiring specialized science or engineering degrees. In a change from past decades, many foreign students pursuing such degrees have chosen to return to their home countries rather than live and work in the United States.

Compounded by fewer American students' studying hard sciences and engineering, this trend will have a negative effect on manufacturers seeking to expand their production. The US government could stop this "brain drain" by revising green card requirements to keep these foreign advanced-degree students in the United States after graduation. For instance, the United States could offer a green card that would be activated through gainful employment in the person's field within two years of graduation. This policy would demonstrate the nation's determination to continue building its robust manufacturing base.

10. Level the playing field with China.

Current US policies were based at their creation on China's classification as a developing economy. China has developed, and the United States needs to treat it accordingly.

11. Rethink regulation.

The United States needs strong protections for the

environment and its people. Americans don't want to live in a polluted world with food unsafe to eat, but they also need to do a holistic rethink of their regulations and decide where those regulations are impairing competitiveness while not helping the quality of the environment or people's lives. We need to set a target of 10% reduction in regulation, getting rid of laws that do very little for the environment but put a significant burden on companies.

12. Focus on one key import—foreign manufacturers.

As we have seen, numerous foreign manufacturers want to produce in the United States for US consumption and even use the United States as a global manufacturing export platform. This trend is likely to continue. The United States is one of the lowest-cost developed world countries and constitutes the world's largest market.

European and Japanese companies are seeing their domestic manufacturing bases turn increasingly uncompetitive. And for many goods, the United States is looking more attractive than China as a production platform, especially given the size of the US market. Importing manufacturing to the United States can be an economic boon for this country. The government has to make sure it provides the proper incentives to foreign manufacturers.

Strong winds from China's perfect storm formerly blew in America's face, but to some degree the winds are now at America's back—and in all likelihood will grow more favorable over the decade. Strengthening the economy through a vibrant manufacturing sector should

serve as a goal that unites political parties and promotes collaboration with industry. To do anything less would imperil the nation's economic viability for many years to come.

Conclusion

When China entered the WTO in 2001, with labor wages at an average rate of 58 cents per hour, it created a major disruption in the US economy, leading to the dislocation of millions of jobs as companies in many sectors of the US economy outsourced manufacturing to China. Within a few short years, China leveraged its massive population, government-sponsored industry-centric clusters, and low wages to become the default location for production of all kinds of goods. US companies bet heavily on China, often at the expense of domestic production and jobs. China seemed unstoppable.

US industry initially ignored the implications of the rush to outsourcing. After a brief spell of licking their wounds, companies responded with characteristic American ingenuity and accepted the new economic reality that forced them to adapt and become competitive. In parallel, China has to some extent become a victim of its own success. Wages in that country have been on a steady upward trajectory, rising 15%–20% annually as

increasingly skilled workers demand higher pay, reducing one of China's major advantages. The wage hikes are a large reason that the costs of producing in China and the United States are narrowing for many goods, especially those in what we call the "tipping point industries": computers and electronics, home appliances and electrical equipment, machinery, furniture, fabricated metals, plastic and rubber products, and transportation goods.

By 2015 we expect that for many of these goods, manufacturing in China will yield a total productivity-adjusted cost advantage of less than 10%. Then one must consider the landed costs, which take into account costs associated with transportation, quality, intellectual property risk, management of an extended supply chain, obsolescence risk, and country risk. When these are factored in, China's 10% differential melts away.

Companies, both domestic and foreign, are just starting to recognize the opportunity in reshoring. They are beginning to see that China is no longer the default location for manufacturing and are looking at an increasingly wider pool of potential locations to expand manufacturing. Some of the obvious candidates, such as Vietnam and Indonesia, while having low wages, don't have the infrastructure, workforce, or other requirements to be manufacturing powerhouses. For many companies, surprisingly, the United States is an attractive location to manufacture.

As the United States fought to regain its competitive strength against the threats from China, it found itself building a significant advantage over much of the rest

of the developed world. Thanks to lower labor costs, cheap natural gas, and a favorable outbound shipping environment caused by the trade deficit with Asia and Europe, the United States is an increasingly attractive option for manufacturers looking to serve the US market or use the United States as an export base. On average, the United States enjoys a 15% cost advantage over manufacturing in France or Germany, and 21% over Japan.

While there are many examples of US companies reshoring and of overseas companies adding manufacturing capacity in the United States, we are seeing only the tip of the iceberg. We expect that by the end of the decade, increased manufacturing activity in the United States will add \$100 billion to \$150 billion to the US economy, and 2.5 million to 5.0 million jobs.

While we believe that these trends are robust and sustainable, unforeseen events could slow the pace of the US manufacturing renaissance or reduce its magnitude. For example, a dramatic slowdown in the world economy would mean that demand for goods everywhere would decrease, thus curtailing the need for additional manufacturing capacity. Or, in the unlikely event that the euro zone collapsed, there could be new low-cost manufacturing options in Europe, reducing the amount of exports US manufacturing could capture.

Much of our analysis hinges on the fact that wages are continuing to rise in China. The Chinese government could clamp down on both wage hikes and the growth of its own economy. However, that government has forged a unique social contract with its people over the past 30

years, providing dramatic growth in prosperity for the masses while mandating their submission to wide-scale political repression. Maintaining this balance requires allowing wage and broader economic growth. Imposing financial hardship on its people seems unlikely, as this could cause civil unrest and a reluctance for other countries to trade with China. Still, the government could nevertheless move in that direction.

A natural catastrophe could change the equation, and not just for the country in which the event occurred, due to the ripple effect. Of course, the specific repercussions of such an event are impossible to predict, as is the likelihood of the event. A man-made event, such as war, could also have a profound effect on the scenario we have laid out, but again, the specifics of a hypothetical occurrence can't be detailed or known.

What we do know is that while economic data change, the laws of economics have not—and won't—meaning that cycles repeat themselves. Manufacturers look for low-cost labor to be able to make and sell goods at the best prices. New sources are found; challengers come in and compete on price. As their own economies and abilities develop, these challengers take on different roles. Costs go up, and they seek to capitalize on their knowledge and newly gained expertise by looking to build their own strong brands, paving the way for the next wave of lower-cost competitors.

The pendulum swung far away from the United States' favor. Now that it is swinging back in favor of the United States, it is up to us to seize the opportunity rather than

be blindsided by it. To that end, smart companies need to remember four things:

- 1. Don't even consider abandoning China.** The new paradigm will be to manufacture in China and the United States, not one or the other. It's all about where to put the next plant. China-based plants will be busy serving China and other export markets. The United States may prove the best place for the next plant to serve the North American market.
- 2. Differentiate among products.** Many products intended for the US market should still be sourced from China. Products that require less labor and are created in modest volume—especially heavy, expensive-to-ship products such as household appliances and construction equipment—become strong candidates to shift to US production. Labor-intensive products made in high volume, such as footwear and apparel, remain strong candidates for manufacturing overseas.
- 3. Make decisions based on total cost.** Companies should undertake a fresh, rigorous, product-by-product analysis of their global supply networks that takes into account the total cost of production (TCP). Rather than fixate on labor rates, this analysis should factor in worker productivity, transit costs, time-to-market considerations, logistical risks, energy costs, and other expenses in a

range of scenarios. For many goods, China's cost advantage will shrink to a negligible figure or will disappear entirely.

- 4. Think long term.** Companies need to take a long-term perspective, looking 5–10 years out versus relying solely on “today.”

Manufacturers that remain in China for economic or strategic reasons will have to find dramatic ways to improve efficiency if they are to preserve current levels of profitability in the face of double-digit annual wage hikes.

There is no “other China”—no country with the infrastructure, promise of low wages, large domestic market, and ability to direct the economy that China has. The United States certainly isn't the only country likely to benefit from rising costs in China. Even so, the size of the opportunity is enormous, and the potential impact on the US economy is great. And then there are the reasons that make the United States an attractive export base.

There is no reason, no excuse, for companies to be caught sleeping. They need to prepare to capitalize on this opportunity. That is why we have argued vigorously for the need for a revamped educational system that prepares people for roles in manufacturing, a commitment on the part of companies to train people, and changes in US government policy in everything from taxes to trade to education.

Those who have been writing US manufacturing's obituary need to recall Mark Twain's famous “last” words:

“The reports of my death are greatly exaggerated.” The story of the US manufacturing renaissance is an evolving one, not one whose end has already been written.

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Until recently, Hal was global leader of BCG's Operations practice, which includes manufacturing, procurement, supply-chain management, asset productivity, and cost reduction. Prior to that, he served as global leader of the firm's Information Technology and E-Commerce practices. He has more than 30 years with the firm and extensive experience across a wide range of topics, industries, and geographies.

Hal has been a guest on CNBC, CNN, ABC, NBC, CBS, Fox Business Channel, NPR, and numerous other broadcast outlets. He has also contributed commentary

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In addition, he has authored or coauthored numerous publications, including three *Harvard Business Review* feature articles: “Fix the Process, Not the Problems” (1990), “Innovating for Cash” (2003), and “The Hard Side of Change” (2005). Other articles have appeared in outlets such as WSJ.com, HBR.org, *Barron’s*, *Strategy and Leadership*, *Journal of Business Strategy*, *The Huffington Post*, and *IndustryWeek*. Currently, he contributes weekly to Businessweek.com’s *The Management Blog*.

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