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India Is an Essential Counterweight to China—and the Next Great U.S. Dependency

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As America seeks to counter a rising China, no nation is more important than India, with its vast size, abundance of highly skilled technical professionals, and strong political and cultural ties with the United States. But the parallels between America's dependency on China for manufacturing and its dependency on India for IT services are striking.

KEY TAKEAWAYS

- While America and India are both rightly keen to move more manufacturing operations from China to India, significant shifts will take time, as China still has many advantages.
- Most large U.S. companies now rely heavily on India-based IT services—whether from India-headquartered IT service providers, U.S.-headquartered IT services companies with large India-based operations, or their own India-based capability centers.
- The United States risks becoming overly reliant on India as an IT services provider if major disagreements emerge over issues such as intellectual property, data governance, tariffs, taxation, local content requirements, or individual privacy.
- Leading U.S. tech companies are well positioned in India's booming Internet and e-commerce marketplaces, but strong local competitors are emerging.
- India is moving up the value chain into R&D, innovation centers, machine learning, analytics, product design and testing, and other areas, especially in IT and life sciences.
- Outside of IT, U.S. companies operating in India typically face stiff competition from Chinese, Japanese, Korean, and of course, Indian firms—and doing business in India is still often difficult.
- While geopolitical forces are drawing America and India closer together, long-term alignment with the United States and the West is by no means assured and will require successful policymaking by both India and the United States.

INTRODUCTION

The same forces that increasingly divide the United States and China are now pushing the United States and India closer together. Although getting its own house in order remains America's top global competitiveness priority, few, if any, bilateral relationships match the potential of closer U.S./India alignment. There is clearly a great deal of speculation and enthusiasm, but what can we realistically expect over the long course of the 2020s? Can leveraging India really help the United States countervail today's rapidly rising China?

The surface case for India as an alternative to China is compelling. While these two nations couldn't be much more different historically, politically, and culturally, both countries also have much in common: Decades-long efforts to lift their people out of poverty; vast domestic markets; huge numbers of skilled scientists, engineers, and technicians; large supplies of low-cost labor; a global diaspora of multilingual students, professionals, and entrepreneurs; and deep information technology (IT) capabilities.

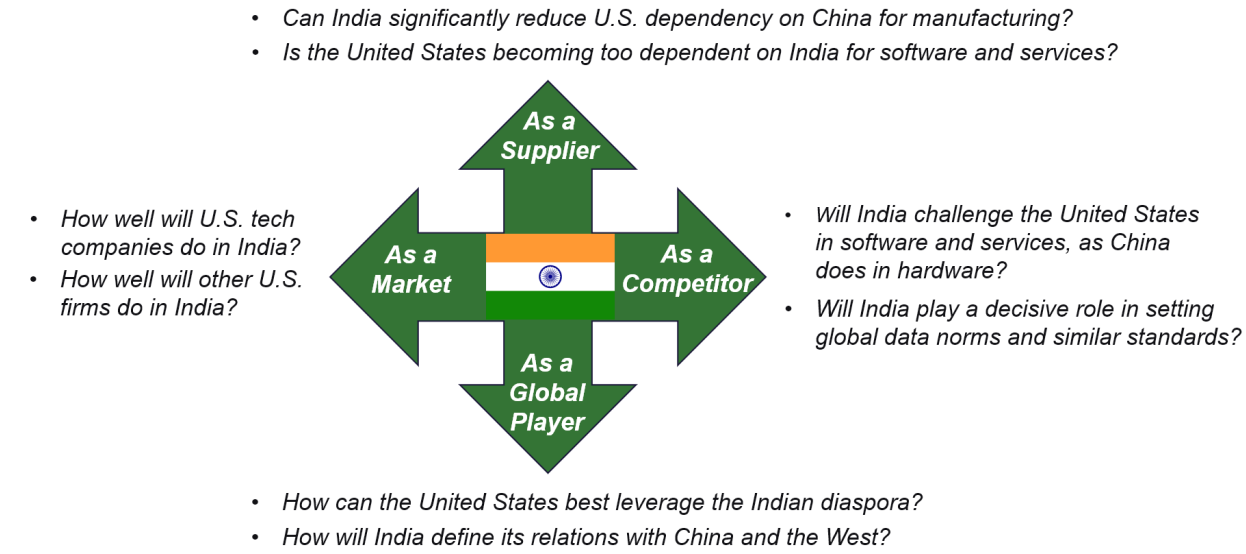
The surface case for closer U.S./India alignment is also compelling. Both are democracies, with strong linguistic, legal, and cultural affinities. And like the United States, India sees China as a geopolitical and military rival. Moreover, India has the potential to become an important global manufacturing hub for U.S. companies seeking an alternative to China, and the giants of the U.S. technology industry are well positioned to succeed in what will soon be the world's most populous nation.

Yet, there is another, potentially more worrisome parallel. Although COVID-19 has made America all too aware of its dependence on China for many essential manufactured goods, our rapidly increasing reliance on India for important hi-tech services gets far less attention, even as most of America's leading companies have either set up large technology operations in India or continue to rely heavily on India-based IT capabilities. The similarities between the way American enterprises depend on India for IT services and China for manufacturing are striking. Moreover, even if India becomes a stronger partner and ally now, this does not mean they will remain one in the years ahead.

Looking forward, America must also see these dynamics through the eyes of India, which has its own self-reliance movement (*Atmanirbhar Bharat*) and history. While India greatly values the ready access to the U.S. market its large technology services firms (e.g., HCL, Infosys, TCS, and Wipro) enjoy, it's also wary of becoming too dependent on companies such as Google, Facebook, Amazon, Walmart, and Microsoft. And like the United States, India needs to carefully balance its own fears, opportunities, dependencies, and tensions with China.

Taken together, the interplay between the United States, India, and China will shape global competition and digital innovation for years to come. This paper systematically assesses the outlook for the U.S./India relationship using the framework shown in figure 1 and addressing the eight questions shown.[1] We argue that, although the "India as a supplier" dimension is the most important today, all four dimensions will prove critical over the course of the 2020s, with each requiring a different set of supporting government policies. While there is a wide range of possible scenarios, two things are clear: India should be an essential part of U.S. efforts to compete with and reduce its dependence on China, and this will inevitably expand America's global dependencies from manufacturing to services.

Figure 1: Leveraging India—key strategic questions



PART 1: INDIA AS A MARKET

Table 1 provides comparative statistics for India, China, the United States, and the European Union. Although definitions of terms such as Internet users, literacy rates, speaking English, e-commerce, and what counts as a STEM (science, technology, engineering, and math) degree vary widely, the data reveals some significant messages, including:

- China has vastly outperformed India over the last 30 years, and now has an economy and per capita incomes roughly five times as large as India's. China has also outperformed India in infrastructure, transportation, mass education, literacy, public health, e-commerce, work opportunities for women, and other domains. India clearly has a lot of catching up to do, and many doubt that it will close these gaps with China anytime soon. However, given India's younger demographics, the long-term picture may prove considerably brighter.
- Much of the disparity between China and India pertains to productivity growth. For example, China started off with one-third of India's productivity level in 1970; four decades later, China's labor productivity level is 67 percent higher than India's.[2] Fortunately for India, it is much easier for a nation to grow productivity faster when it is lagging behind, as opposed to being closer to the forefront.
- Total U.S. imports and exports for physical goods to and from India are just one-sixth of those with China. The official story is similar regarding services, with U.S. government data showing the United States importing some $30 billion of all types of services from India in 2019, and running a $5.4 billion annual services deficit.[3] However, we believe the services deficit figure is greatly understated. The respected India IT industry trade organization, the National Association of Software and Services Companies (NASSCOM) says that India exported $136 billion in IT services in 2019, with over 60 percent of this business coming from U.S. firms (which would mean over $80 billion in IT services exports alone to the United States).[4] As discussed in the India as a Supplier section, IT services are provided, paid, and accounted for in many different ways—some of which

seem to have eluded the official trade definitions.[5] Having to acknowledge the real services deficit with India would provide a much-needed U.S. wake-up call.

- Europe is less worried about digital technology competition from China than the United States is for three main reasons. As shown in the figure, Europe has roughly equal imports and exports to and from China, so it is much less concerned about its overall balance of trade. Additionally, Europe has long been heavily dependent on the United States and Asia in many key technology areas, so its rising dependence on China is much less of a fundamental change. Third, Europe is generally more successful than the United States in exporting advanced industry products to China (although if China continues to progress on its self-sufficiency goals, this may change). These three factors explain why getting Europe to be "tough on China" will likely be harder than many people think.

Table 1: Global players at a glance*

	India	China	United States	European Union
Population	1.35B	1.39B	330M	744M
GDP	2.7T	13.6T	21.2T	18.2T
GDP growth (2010-20)	6.8%	7.5%	2.5%	2.0%
Per capita GDP	$2,010	$9,770	$62,794	$35,623
Internet users	700M	880M	275M	655M
Literacy rate	70%	97%	99%	99%
Life expectancy (years)	69.4	76.7	78.5	81
% English speakers	15-25%	1-5%	88%	51%
Retail e-Commerce	$60B	$1.5T	$600B	$780B
Annual STEM degrees	2.6M	4.7M	560K	800K
Total exports	$320B	$2.5T	$2.5T	$2.3T
Total imports	$490B	$2.1T	$3.1T	$2.3T
U.S. imports from	$58B	$450B	--	$464B
U.S. exports to	$34B	$106B	--	$280B
U.S. balance of trade	-$20B	-$344B	--	-$184B

* *Data is drawn from many sources that are often conflicting and differently defined. It is best used for broad comparative purposes.*

In determining how things might change in the future, three key questions emerge: 1) Will India significantly close today's vast gross domestic product (GDP) gap with China; 2) how will India's booming digital economy evolve and will U.S. firms succeed in it; and 3) can the United States expand its exports to and business within India to reach China-like scale? Each of these questions is briefly addressed ahead, showing that there are both real opportunities and some unrealistic expectations. (America's large trade deficit with India in IT services is discussed in the sections on "India as a Supplier" and "India as a Competitor.")

India's Impact on the Overall U.S. Economy Will Be Modest in the 2020s

Forecasts regarding India's economic outlook vary considerably—and of course, no one knows how the world economy will perform. While some experts praise many of the economic incentives and reforms initiated by Prime Minister Narendra Modi, others lament what they see as increased cronyism and widening societal divisions. Although there has been an uptick recently, COVID-19 cases, hospitalizations, and deaths are still down sharply from their peak, and this—along with recently announced government budgetary plans—has led to increasing optimism regarding the next few years, after the steep economic declines of 2020.

Most long-term GDP growth forecasts for India are in the range of 5–8 percent annually. If results end up being in the lower end, India won't gain much if at all on China; and even at the higher end, only a modest closing will likely occur in the 2020s. For example, if India grows at 8 percent for the next ten years, and China just 4 percent, the Chinese economy will go from being five times as large as India's in 2020 to four times as large in 2030. Thus, it seems fair to say that the size of India's economy will not come close to rivaling that of China—or the United States or Europe—in the 2020s. However, over the longer term (say, by 2050), much bigger shifts are possible, particularly since India still has major "low-hanging fruit" productivity gain possibilities, of the sort China has exploited over the last 30 years. Indeed, "overstaffing" in India is still rampant, and, with political will, could be a source of large, rapid productivity gains.

The Prospects for Large U.S. Technology Firms Within India Are Currently Excellent

Ever since 1947, when Jawaharlal Nehru, the prime minister of the newly independent India, began showing a deep personal interest in science and technology, as well as a wariness about becoming too dependent on global business forces, the market for IT products and services within India has had an unusual and still-revealing history. Strict import and foreign exchange restrictions and other barriers resulted in the so-called "License Raj" that often made it very difficult for Western firms to do business the way they normally would, while forcing India to meet many of its own IT needs. This digital isolation also motivated many of India's most talented IT and engineering professionals to pursue opportunities in the United States and elsewhere.

India's IT services industry has deep roots in this history. For example, Tata Consultancy Services (now TCS) initially thrived by servicing IBM and Burroughs mainframes in India, especially after IBM famously exited the India market from 1977–1992 because of differences with the Indian government.[6] Similarly, in the late 1970s, Hindustan Computers Limited (now HCL) began making microcomputers and calculators for domestic market use. Likewise, in the early 1980s, Western India Palm Refined Oil (now Wipro) launched its technology businesses by making Intel-based mini and microcomputers. But mostly because of high import tariffs on components and lack of scale, these domestic hardware efforts could not keep up with global competition, so both HCL and Wipro wisely shifted to IT services.[7]

Even today, India's biggest technology companies and most-influential digital leaders are focused primarily on the global IT services business. This has helped create space for U.S. tech giants to build strong positions within India's potentially vast domestic Internet market, as only in recent years have major Internet players and a vital start-up culture emerged from within India. Contrast this with China, which more than a decade ago essentially blocked Google and

Facebook from the mainland China market, creating space and time for Baidu, Alibaba, Tencent, and others to become what they are now.

How well positioned are the U.S. giants in India? Consider the following:

- Google dominates in search and streaming video (YouTube) and with mobile-phone software as Android phones comprise most of the Indian market. Google Pay has also become a market leader. The company has an 8 percent stake in Reliance Jio, India's largest Internet service provider, and is investing heavily in a wide variety of venture capital and market development activities. It doesn't hurt that Google CEO Sundar Pichai was born in Madurai, India.
- Facebook has some 300 million users in India, roughly a 10 percent stake in Reliance Jio, and a very strong position in digital advertising. WhatsApp also has a major presence in India and may prove to be a springboard into various e-commerce and payment opportunities.
- Despite India's often byzantine retail e-commerce regulations, Amazon and Flipkart (which is 75 percent owned by Walmart) are currently the two leading retail e-commerce players in India, although large Indian conglomerates such as Reliance and Tata are seeking to change this. Amazon's AWS has a very strong cloud computing position in India, especially within the software development community. Amazon is also investing in Indian supermarkets and department stores, and Prime Video is gaining momentum. The company is believed to have over 60,000 employees in India.
- Like Amazon, Microsoft is a major supplier of cloud computing and office automation services to the leading Indian IT services firms as well as many large Indian companies. Last year, some 10 million Windows PCs were sold in India; and, of course, Microsoft CEO Satya Nadella (born in Hyderabad) is among the most famous and respected people in all of India.
- Netflix, Uber, and Twitter are also well established in India.

This strong U.S. presence suggests a scenario wherein American Internet companies could combine their Western market success with solid positions in what will be the world's most populous nation, resulting in a larger total market opportunity than China's Internet leaders are likely to serve. The timing of this scenario seems especially good, as India's digital markets are still in a high-growth phase, triggered some five years ago by the availability of low-cost mobile phones and sharply reduced wireless data prices. Many within India now expect an additional phase of strong digital growth led by agricultural, health care, and educational services, although these applications have been relatively slow to catch on in many nations.

Notably missing in the above list is Apple, which has been less successful in India, with a market share of only around 3 percent in mobile phones. Indeed, there is just one Apple store in all of India, versus 42 in China. Apple's MacIntosh personal computer market share is also lower than it is in most Western markets. Apple's high prices are clearly a barrier, as is the predominance of Microsoft Windows within Indian IT services firms. Perhaps Apple's iPhone assembly efforts in Bangalore (through India-based Wistron) and Chennai (through Taiwan-based Foxconn) will help improve its prospects.

Apple aside, today's upbeat outlook for U.S. technology firms is reinforced by Alibaba's and Tencent's recent scaling back of their once ambitious India efforts. Largely due to the current geopolitical tensions between India and China, both companies are now much more focused on the potentially lucrative ASEAN (Association of Southeast Asian Nations) region. Whether Chinese technology firms will aggressively return to the India market at some point and whether India will eventually establish its own cloud and e-commerce giants are discussed later in this paper. For now, the prospects for America's leading cloud and Internet firms are encouraging, although India's equalization levies and other taxes, yet-to-be-finalized data privacy laws, and other regulations could make operating within India more difficult for some U.S. companies.

Outside of the Digital World, U.S. Opportunities Within India Are Less Favorable

As noted earlier, total U.S. exports to India are about one-third of those to China, and the scale of U.S. operations within India is typically much smaller as well. Consider that Starbucks has 190 outlets in India and over 4,000 in China; there are 160 McDonalds in India and over 2,000 in China; Hollywood's sales in India are a fraction of those in China, and, because of the huge popularity of cricket, the same is true of the NBA. As with China, doing business in India is still often difficult, with lots of red tape, preferences for local firms, and still-widespread intellectual property concerns.[8] According to the World Bank, India ranks 63rd in terms of its ease of doing business, up from 77th the previous year, but short of its goal of being in the top 50.

As it took the United States more than 20 years to get into its current mess with China, it might take a similar period of time to fully turn things around in India.

U.S. government statistics show that the main American exports to India are for defense, aircraft, machinery, mineral fuels (oil, gas, coal), precious metals, and chemicals, areas in which growth expectations are generally modest. In major consumer markets such as cars, appliances, electronics, and other areas, the competition from entrenched Japanese, South Korean, Chinese, and local companies is fierce. Even in pharmaceuticals, wherein the United States is highly competitive and the potential market is large, India already manufactures many U.S. pharma products, and local Indian pharma companies are becoming increasingly competitive (in part because of weak intellectual property protections), so the upside seems modest.

The bottom line is, outside of the digital world wherein the opportunities are excellent—providing the Indian government does not follow the path of China—leveraging the potentially vast Indian economy to reduce the importance of China as a market in the 2020s will be challenging for most U.S. companies and industries due to India's smaller market size, strong international competition, and preferences and protections for its own companies and institutions. As it took the United States more than 20 years to get into its current mess with China, it might take a similar period of time to fully turn things around.

Policy Goals and Recommendations

- Make sure U.S. firms, especially technology and Internet firms (including e-commerce and payments) have the same access to the India market as India does to the U.S. market in terms of licenses, taxes, tariffs, data usage/storage, e-commerce, privacy, etc. India greatly values its access to the U.S. IT services market, so this is a very powerful bargaining chip that should be used as needed to ensure relatively fair and balanced trade between the two nations. For example, imposing taxes on India's IT services sales in the United States could be used to offset any digital services taxes imposed on U.S. firms operating in India, as opposed to the tariffs on imported physical goods from India that the Biden administration has recently proposed.
- Develop joint U.S./India technology policies, rules, and regulations in the above areas as a potentially powerful alternative to the EU—and China—in terms of setting global norms. As many of India's policies in these areas are being developed now, the Biden administration should make this an immediate priority.
- Reinstate and strengthen the U.S.-India Strategic and Commercial Dialogue, an annual forum for policy discussions between the governments of the United States and India, which the Obama administration started and the Trump administration did not continue.
- Seek a limited U.S./India free trade agreement focused on key technology areas, including having India join the ITA-2 agreement and establishing agreements on cross-border data flows.

PART 2: INDIA AS A SUPPLIER

Table 2: India is a major IT supplier to every private sector industry

Industry	Is India a Major Market?	Is India a Major Non-IT Supplier?	Is India a Major IT Supplier?	Is China a Major Supplier	Is India a Global Competitor?
Health care, pharma/life sciences	✓	✓	✓	✓	✗
Retail, wholesale, distribution	✓	✗	✓	✓	✗
Discrete and process manufacturing	✗	✗	✓	✓	✗
Energy, transportation, utilities	✗	✗	✓	✓	✗
Travel, entertainment, hospitality	✗	✗	✓	✗	✗
Media, publishing, information services	✓	✓	✓	✗	✗
Professional services	✗	✓	✓	✗	✓
Food and agriculture	✗	✗	✓	✗	✓
IT hardware, software, Internet services	✓	✓	✓	✓	✓
Banking and capital markets	✗	✗	✓	✗	✗
Life, P&C, health insurance	✗	✗	✓	✗	✗
Defense and defense contractors	✓	✗	✗	✗	✗
University education	✓	✓	✗	✗	✓
Yes / No Totals	**6 / 7**	**5 / 8**	**11 / 2**	**5 / 8**	**4 / 9**

Large U.S. Companies Are Becoming Increasingly Dependent on India for IT

Table 2 looks at the situation within individual industries, showing which sectors view India mostly as a market, a supplier, a competitor, or some combination. Obviously, reducing such vast and diverse industries to a binary yes or no judgment greatly oversimplifies things, but having shown this figure to numerous industry participants, we think the assessments generally hold.

The issue of "India as a market" is discussed in the previous section, and the emergence of "India as a competitor" is addressed in the following one. In this section, we focus on columns two, three, and four of table 2: India as a supplier of IT services, India as a supplier of things other than IT services, and how these two supply-side situations compare and relate to the supply-side challenge from China.

The most telling part of table 2 is the 11–2 total shown. Nearly every U.S. private sector industry now relies on Indian IT services in one way or another. The only sectors that tend not to are defense and education, which prefer to do most of their own IT, use domestic-based partners, or both. Overall, U.S. companies source IT services from India in four main ways:

1. Contracting directly with an Indian IT services supplier such as TCS, Infosys, Wipro, HCL, Cognizant, or others. India's service companies have historically offered lower-cost back-office IT operations, but in recent years these firms have also moved up the value chain into more strategic areas such as cloud migration, business analytics, process automation, artificial intelligence (AI), machine learning, the Internet of things, and other forms of "digital transformation."
2. Sourcing indirectly from India by procuring services from Western companies such as Accenture, IBM, Deloitte, DXC, and others that do much of the actual work in India. As is discussed in the next section, these four U.S. organizations alone employ some 400,000 people in India.
3. Setting up company-owned operations in India. Sometimes this is called "in-sourcing," sometimes Global In-House Centers, and sometimes Global Capability Centers (GCCs). But whatever one calls it, over 1,200 U.S. multinational organizations have set up their own India operations that are used for everything from low value back-office IT and call centers to strategic innovation and R&D.9 (In this paper, we will use the term GCCs.)
4. Bringing Indian citizens to the United States to work for their company. There are over 400,000 non-U.S. residents working in the United States through the H1-B visa program. Roughly three quarters of them—overwhelmingly in IT—are from India.

These four distinct business models help explain why getting accurate services trade data is more difficult than in many manufacturing markets. They also show how U.S. reliance on India for hi-tech services has expanded over the last 20 years. More than 2 million people of Indian nationality (some 600,000 of whom are highly skilled digital professionals) are now working to meet the IT needs of U.S. corporations.[10] (This doesn't count the great number of American citizens and permanent residents of Indian heritage now working in tech hubs such as Silicon Valley, research institutes, universities, and other sources of digital innovation.) As only an estimated 5 million U.S. citizens are IT professionals, it's clear that India is now an essential part of America's digital ecosystem.

Looking back, the parallels with China are remarkable. The rise of China was given a great boost by its admission into the World Trade Organization in 2001. Similarly, India's major IT services companies substantially increased their global business and reputation by doing much of the work needed to manage the "Y2K" challenge that dominated the IT agenda from 1998–2000. Today, some U.S. companies have set up their own capabilities in India (much like they do in China), while others use local companies. And, as with China, over time, these operations have evolved into hard-to-replace talent and experience pools.

In some ways, the United States' reliance on India is greater than it is on China. As shown in table 2, only five U.S. industry sectors—all manufacturing based—have become dependent on China, whereas just about every industry now relies on India for IT. Most of these industries are doubly dependent in that they also increasingly rely on Amazon and Microsoft (and to a lesser extent Google) for the cloud computing services that enable their businesses to function—and these three U.S. cloud providers have their own dependencies on India for talent, leadership, and ongoing support.

Indeed, many manufacturing organizations now face three levels of dependency: China for physical goods, India for legacy IT services, and the U.S. cloud giants for their core digital infrastructure. All three of these developments have taken place in less than 20 years, and although being dependent on India is not nearly as scary as being dependent on a geopolitical rival such as China, it is dependency nonetheless. We return to this theme in this paper's concluding section.

Outside of IT, India Can Help the United States Reduce Its Manufacturing Dependency on China

Since COVID-19, most of the discussion about India as a supplier has focused on whether U.S. companies can move some of their China-based manufacturing to India or other low-cost nations such as Mexico, Vietnam, the Philippines, and Indonesia. Japan, South Korea, and Taiwan now offer substantial reshoring incentives, and America should do much more in this area if it wants to significantly reduce its China dependencies, as many U.S. companies will need to be pushed, incented, and even shamed into reducing their current China footprints.

The parallels with the way the United States has become dependent on China for manufacturing are clear.

India is keen to attract manufacturers interested in moving work out of China by both building on its current manufacturing strengths and positioning itself for the growth markets of the future. It also wants to shift from its long history of viewing domestic manufacturing primarily as a means for import substitution to directly targeting global export markets. Industries wherein Indian manufacturing is now strong include chemicals, pharmaceuticals, plastics, textiles, apparel, and steel. The future target list includes mobile phones, semiconductors, medical devices and supplies, automobile parts, batteries, telecom equipment, food products, white goods, textiles, defense production, electronics, solar panels, and most recently, toys. Just about all of these are major areas of Chinese manufacturing today.

To demonstrate that it wants to support global manufacturers, India emphasizes its direct financial support through its Production Linked Incentive (PLI) scheme (which provides cash incentives for volume manufacturing increases), competitive corporate tax rates, approvals of both joint ventures and 100 percent-ownership structures, infrastructure improvements, low-cost labor, land-use reforms, access to the domestic India marketplace, the rule of law, the use of the English language, and free trade agreements with most major markets.[11] Some of these features, particularly the rule of law, could be especially appealing to firms seeking to move from China.

This all sounds good, and progress should be made over time, but many believe that India must improve considerably in most of these areas. As China's domestic wages rise, its youth are less willing to work in factories, and it seeks to move up the value chain, China is also exploring offshore possibilities, mostly within the ASEAN region as well as within participating Belt and Road nations. Additionally, China still has significant advantages in infrastructure, just-in-time supply chains, reliable electrical power, shipping and logistics, practical manufacturing skills and experience, robotic automation, and related capabilities and services. For example, with mobile phones, India is mostly doing basic assembly for only the Indian market, whereas China is deeply involved in just about every part of the global manufacturing value chain. Whether India can move up the smartphone value chain and compete in export markets against China and Vietnam will likely be an important test of its overall manufacturing potential. It has a long way to go.

The bottom line is that U.S. use of and dependence on India-based IT services is by far the most important aspect of the India-as-a-supplier dimension. The parallels with the way the United States has become dependent on China for manufacturing are clear.

Policy Goals and Recommendations

- Include software and services dependencies in any U.S. national self-sufficiency and supply chain initiatives.
- Collect much more accurate and detailed IT services trade data that fully accounts for services provided to U.S. customers by Indian IT services firms, U.S. services firms doing their work in India, GCCs set up in India by U.S. firms, and services provided by Indian individuals working in the United States via an H1-B or other visa.
- Incentivize and encourage U.S. firms seeking low-cost production alternatives to China to select India if this work can't be moved back to the United States.

PART 3: INDIA AS A COMPETITOR

The East Asian economic development model has now been in place for more than 50 years, having been successfully adopted by Japan, Singapore, South Korea, Taiwan, and most recently China. Of course, there are important national differences, but these countries have all prioritized education (especially technical education), infrastructure, global export markets, and a strong, supportive, and strategically engaged state. All five nations also started with commodity manufacturing and then moved up the value chain to become global leaders in various advanced technology markets. In this sense, China can be seen, economically, as a giant Taiwan, and the fact that it is a communist system may be less central to its economic success than many commentators believe (although clearly communism remains central to China's political system).

In all of these cases, U.S. firms chose to use Asian manufacturing because it made them more competitive in the short run. In the case of China, the U.S. motivation was both to compete better with Japan and South Korea and to gain access to the massive China market, which the Chinese government often made contingent on setting up local manufacturing operations. The potential long-term dependency implications of these decisions were a secondary factor at best.

Like Japan, Singapore, South Korea, and Taiwan, India's global focus was on exports, usually ones relatively low in the value chain, and then moving upward over time. While the Indian government has generally been less directly engaged than in the big four Asian countries, NASSCOM, founded in 1988, has played a similarly important role in promoting and steering the Indian IT sector. As with Asia, the reason U.S. firms choose to use India is it makes them more competitive in the short term. Once again, the long-term implications have been largely ignored.

Table 3: Leading players in India's five key IT/digital market sectors

1. India-based global IT services companies

Company	WW Revenues	WW Market Cap	WW Employees
TCS	$23B	$137B	450,000
Infosys	14	64	240,000
Cognizant	20	43	280,000
HCL	10	30	150,000
Wipro	8	27	175,000
Tech Mahindra	5	10	125,000
Mindtree	1	3	22,000
Total*	**$81B**	**$314B**	**1,442,000**

2. Global IT services firms with large India operations

Company	WW Revenues	WW Market Cap	WW Employees
Accenture	44	$160B	170,000
IBM	77	106	140,000
Deloitte	20[e]	60[e]	35,000[e]
Cap Gemini	17	20	100,000
DXC	20	7	35,000
Atos	12	7	35,000[e]
Total*	**$190B**	**$360B**	**515,000**

3. Global companies with India "insourcing" operations

Over 1,200 firms, $30B per year spend, 1 million employees in India[e]

4. India-based Internet companies

Company	India Revenues	WW Market Cap	WW Employees
Reliance Jio	$21B	$67.0B	20,000[e]
Airtel	12B	36.0	18,000
Vodaphone Idea	1.6	4.7	13,500
BSNL	2.7	N/A	69,000
Flipkart (Walmart)	6.1	40-50	30,000[e]
IndiaMart	0.4	3.6	3,600
Total*	**$43.8B**	**$156B[e]**	**154,100**

5. U.S. Internet giants

Company	India Revenues	WW Market Cap	India Employees
Facebook	$1.8B	$770B	N/A
Amazon	1.5	1,670	62,000
Apple	1.5	2,290	5,000[e]
Microsoft	1.2	1,840	6,500
Google	0.75	1,400	5,000[e]
Netflix	0.13	250	N/A
Total*	**$6.9B**	**$8,220B**	**85,000[e]**

[e] Best estimate available.
[*] There are other players, so this is not the full market total.

Professional Services Versus "The Cloud"

Parts 1, 2, and 3 of table 3 depict the market for "1-to-1" IT services, meaning that the supplier does work that is customized and priced for an individual customer. (Outside of the United States such custom work is often referred to as "bespoke services.") In contrast, parts 4 and 5 show the leading "1-to-many" suppliers, which deliver essentially the same service to as many customers as possible. India's 1-to-1 IT services firms are focused primarily on global export markets, while its 1-to-many firms are almost entirely focused on India's domestic market.

This is very different from in the United States. Ever since the rise of the Internet in the mid-1990s, the U.S. 1-to-many model has been the global focus, growing much faster and valued much more highly than the 1-to-1 approach, as is made clear by the huge U.S. market valuations shown in part 5 of the figure. Indeed, the biggest risk to India's IT services leaders is that 1-to-many cloud services might someday improve so much that the need for extensive 1-to-1 custom work will eventually decline. While this dynamic has been predicted for many years, it has yet to materialize, as new tasks and needs continue to more than offset increasing digital automation. But given today's advances in AI, robotic process automation, chatbots, and other areas, it remains a distinct possibility. Indeed, to the extent that U.S. policy can support these and related technologies and their adoption by firms in the United States, this could significantly reduce IT services imports.

As India develops its 1-to-many companies and capabilities, it will inevitably compete with the U.S. market leaders within India, and perhaps eventually beyond. We already see this in the competition between Amazon and Reliance, and Uber and Ola, but we should expect much more going forward. Perhaps India will develop its own cloud player(s), perhaps it will export and build on its impressive Aadhaar biometric ID system, or perhaps it will develop a powerful open-source operating system for low-cost mobile phones. But perhaps most strategically important, given today's disagreements between the United States, Europe, and China, India could well play a decisive role in setting global norms in data ownership, in-country storage, privacy, and other areas. There are many such possibilities.

Additionally, there are important areas in which India does not follow the Asian model. In many scientific and technical fields, India now competes primarily at the very high end of research and innovation, often with little presence lower down the value chain. The United Kingdom and Israel are good examples of nations that manage to compete effectively in advanced innovation without necessarily a major presence in large-scale manufacturing or distribution. Leading-edge technical universities and research institutes are generally the key to this strategy, and India increasingly will have them, as it is now home to 20 of the top 1,000 research universities globally.[12] We expect India to become an ever-more influential part of the U.S. R&D ecosystem, and potentially a very important R&D counterweight to China.

Looking out over the longer term, a key strategic question is whether India might combine a newly gained manufacturing prowess with its advanced digital capabilities to innovate across the entire value chain. Currently, the mostly likely area for this leadership scenario is in pharmaceuticals and biotech wherein India already has a solid manufacturing base, deep technical talent, and many GCCs successfully serving the global pharmaceutical leaders in areas such research, analytics, clinical trials, and associated services. If India could extend this

approach to other industries such as electronics, consumer goods, and energy, its overall economic outlook and strategic positioning would improve significantly.

The bottom line is India's IT capabilities in everything from back-office support to cutting-edge R&D are accelerating innovation and helping many U.S. firms stay competitive. However, it seems inevitable that, over time, India will evolve toward being not just a supplier, but a robust competitor—and in this sense, the evolution of the software and services industry will likely parallel the coopetition we have seen with China in manufacturing, with many of the potential risks that shift has created.

Policy Goals and Recommendations

- Include software and services in U.S. competitive assessment efforts and supporting initiatives.
- Leverage India's dependence on U.S. market access to gain support for U.S. positions regarding cloud data storage, data management, privacy, and related issues.
- As leading in technology is not enough, America must also seek to lead in usage. Public sector leadership in advanced applications such as citizen services, cyber security, digital IDs, electronic health records, smart cities, smart grids, and similar software-intensive areas must be a priority.

PART 4. INDIA AS A GLOBAL PLAYER

Thus far, we've talked about India mostly as a place—a country where important economic dynamics are in motion. But India is also a people—and the spread of individuals of Indian nationality around the world is now a powerful economic force, particularly in the United States and especially within the IT industry. Table 4 lists some of the most prominent technology leaders in the United States who are of Indian heritage. As impressive as it is, it's only the tip of a vast talent iceberg. Although Silicon Valley (now metaphorically often defined to include everything from San Jose to Seattle) has long attracted skilled and ambitious individuals from all over the world, India's presence exceeds that of any other nation. As Information Technology and Information Foundation (ITIF) research has uncovered, 7.5 percent of the most important innovators in America are first- or second-generation Indian immigrants, the most from any country.[13]

How did this come to be? Americans often seem to think that Indians (and Chinese) are just good at math and science, but the reality is much more systematic than that. In the excellent book, *The Other One Percent, Indians in America,* the authors describe a "triple selection" process, which historically worked as follows:

1. India initially provided access to advanced education primarily to those with high social and economic status.
2. Within this elite pool, India's educational and examination systems selected those individuals best suited for advanced technical education.
3. The U.S. immigration system favored international students and individuals with technical talent, especially in IT and STEM fields.[14]

Table 4: Some prominent Indian technologists

- Sundar Pichai, CEO, Google
- Satya Nadella, CEO, Microsoft
- Shantanu Narayen, CEO, Adobe
- Arvind Krishna, CEO, IBM
- Jayashree Ullal, CEO, Arista Networks
- Dinesh Paliwal, CEO, Harman
- Nikesh Arora, CEO, Palo Alto Networks
- Neha Narkhede, Co-founder, Confluent
- Anjali Sud, CEO, Vimeo
- Sanjay Mehrotra, CEO, Micron
- George Kurian, CEO, Netapp
- Vinod Khosla, Co-founder, Sun Microsystems, VC
- Sanjay Mehrotra, Co-founder, Sandisk
- Amar Bose, Founder, Bose Corporation
- Ajay Bhatt, developed USB and other standards
- Vinod Dham, "Father of the Pentium"
- Sabeer Bhatia, Co-founder, Hotmail
- Amit Singhal, SVP and long-time Head, Google Search
- Parag Agrawal, CTO, Twitter
- Sanjay Jha, Former CEO, Global Foundries
- K.B. Chandrasekhar, Founder, Exodus Communications
- Kanwal Rekhi, Co-founder, Excelan, Mentor

Given this process and the often-limited STEM career possibilities within India during the 1970–2010 period, it's easy to see why so many highly educated people from India chose to move to the United States for either school or work. Despite often facing discrimination in America, they have economically thrived, and now enjoy the highest per capita incomes of any U.S. ethnic group. Their impact on the American economy has been vastly greater than their share of the overall U.S. population.

Although IT careers have been a huge part of this success, they are far from the only area. For example, today, there are roughly 3 million people of Indian heritage in the United States (just under 1 percent), but Indians account for well over 5 percent of all U.S. physicians.[15] In politics, Vice President Kamala Harris exemplifies this same highly educated immigration profile, as her mother was a biomedical scientist born in Chennai who came to the United States to get her Ph.D. from the University of California, Berkeley (her father was born in Jamaica and is a professor emeritus at Stanford). Likewise, former U.S. UN Ambassador Nikki Haley's father was a professor at Punjab Agricultural University who came to Canada to get his Ph.D., and her mother studied law at the University of Delhi, and became a teacher in the South Carolina school system.[16]

It's hard to overstate the importance of the triple selection process and the subsequent academic ties between India and the United States There are now some 200,000 Indian students in the United States, with only China having comparable numbers. The figures within STEM fields are particularly striking, with roughly half of all master's and Ph.D. degrees now going to international students. In computer science it is more than half. Overall, 81 percent of full-time graduate students in U.S. university electrical engineering programs, and 79 percent in computer science, are international students.[17] A 2019 Congressional Research Service report finds that nearly 70 percent of foreign students enrolled in STEM courses came from China and India.[18]

It is vital that India's pipeline of talent continues to come to the United States, and that many Indian students decide to live and work in America after graduation, especially as the flow of Chinese students to the United States in advanced STEM fields is likely to slow due to the current geopolitical tensions and the very real concern that some Chinese students act as intellectual property gatherers for the Chinese government. The Biden administration recently delayed making a decision until the end of 2021 as to whether H1-B visas should be awarded based on demand for applicants' skills or on more of a lottery basis. The former is a high priority for digital industries.

Looking ahead, India's domestic educational pipeline will continue to expand as university opportunities become more widely available across society, so the STEM talent supply volumes should be there. However, just as we saw with IT services, Indian students and graduates are both helping U.S. educational competitiveness and increasing its dependencies. U.S. universities would be seriously diminished both substantively and financially if Indian students—and teachers—ever decide to go elsewhere.

Perhaps most importantly, the Indian diaspora is a living thing. Most of the Indian immigrants to the United States initially came and stayed voluntarily—as opposed to fleeing severe hardships and oppression. This has created some potent bidirectional dynamics. The Indian community's very strong networks both within America and back to India—combined with the use of English in both nations—has helped make talented Indians living in America particularly successful as global executives, managers, entrepreneurs, and board members. In contrast, many Chinese professionals in the United States can't travel or communicate back home nearly as easily, especially these days. The two dynamics couldn't be more different, which is why the Indian diaspora remains a uniquely valuable community, not just in the United States, but also in the United Kingdom, Australia, Canada, Singapore, and elsewhere.

U.S./India/China Geopolitical Relations Will Be Critical

It's fashionable these days to see the United States and India as natural partners—two democracies working to limit the influence of a rising China. But, of course, this naturalness is only a recent phenomenon. Throughout the Cold War, India was among the leaders of the so-called Non-Aligned Movement, an international organization that sought to avoid taking sides in the competition between the United States and the Soviet Union. As Jawaharlal Nehru noted back in 1946, "We propose, as far as possible, to keep away from the power politics of groups, aligned against one another, which have led in the past to world wars and which may again lead to disasters on an even vaster scale."[19] For many years, important Indian leaders embraced socialism and often had an "anti-North" attitude.

During the 1980s, the United States was much more closely aligned with India's most direct rival, Pakistan. But as the USSR crumbled, Pakistan came to be seen as too close to the Taliban and Al Qaeda, India's IT industry flourished, and China loomed, the United States and India were increasingly drawn together—a development boosted by the seemingly close relationship between Prime Minister Modi and President Trump, and further accelerated by India's border dispute (and previous wars) with China. Given China's currently aggressive stance in the region, U.S./India ties may well strengthen further.

We review this familiar history simply to suggest that U.S./India relations could easily change once again. President Trump is no longer in office, Prime Minister Modi will be 73 when the next

India general election is likely in 2024, and India's history of non-alignment could easily resurface. The dispute with China over its largely uninhabited border regions has already faded somewhat. And although the Quad (Quadrilateral Security Dialog) between the United States, India, Japan, and Australia provides a framework for collective efforts to curb China, its ability to go beyond the dialog stage is anything but assured. In short, today's U.S./India geopolitical alignment may prove to be more fragile than it appears, especially as the potential business interests between China and India are often compelling.

Policy Goals and Recommendations

- Maintain or increase the flow of Indian STEM talent to the United States via students, immigration, work visas, green cards, and other programs. In addition, given national security concerns, federal policy should encourage research universities to favor Indian over Chinese STEM graduate students.
- Keep India under the U.S. defense umbrella by strengthening and expanding the Quad.

CONCLUDING SCENARIOS

As we have seen, there are many complex dynamics that will affect the degree to which the U.S./India relationship can help offset today's increasingly powerful China. Rather than recap them, these dynamics are summarized via the following pessimistic and optimistic scenarios:

Scenario 1: Tensions between India and China are reduced, and the many business synergies between these two neighboring nations come to the fore. The combination of China's manufacturing might and India's software and service prowess provides across-the-board value-chain capabilities. The United States remains heavily reliant on both nations, whose market sizes dwarf that of America, giving Chinese and Indian companies colossal economies of scale and leading to large bilateral trade deficits for the United States with both nations. These dynamics ultimately result in world-leading Chinese and Indian universities, companies, and research institutions. Given its relatively small size and many dependencies, there is little the United States can do, as the heart of the global economy shifts to the East, and as democratic nations and norms are increasingly seen as failing to keep pace with China's rapid societal progress.

Scenario 2: The interests of India and the United States become increasingly aligned, as the economic, military, and international relations challenges from China grow. Rapidly growing Indian manufacturing, much of it from plants moving out of China, helps reduce U.S. dependencies on China while slowing China's growth. At the same time, Indian students continue to flock to the United States, with many staying and making essential contributions to America's technological capabilities. The Indian diaspora creates even more-powerful bonds between India and the United States, generating a great many business, political, and cultural leaders. Rising U.S. company dependence on India-based technology services proves to have more benefits than drawbacks and is largely offset by the success of U.S. tech giants in India and by ever-improving cloud services that make extensive customized IT services less necessary. As a result, Indian exports to the United States are broadly matched by U.S. business within India, and both nations grow. The combined military prowess of the United States, India, Japan, and Australia (and eventually South Korea and Taiwan) proves sufficient to prevent China's hegemony within the Pacific region. Democratic norms prevail across most of the developed world, with many developing nations looking to the "Delhi model" rather than the "Beijing model."

Clearly, there is a vast middle ground between these two extremes. But by 2030, one scenario will likely prove closer to reality than the other. Which will it be? When we argue that there is now no more important bilateral relationship for the United States than India, this is what we mean. America's technology dependencies on India in the 2020s seem certain to rise. But will the United States be dependent on a strategic partner with strong mutual interests, or on an increasingly neutral rival? Much will depend on the strategic choices the Biden and Indian administrations make. The economic and geopolitical stakes could not be much higher.

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About ITIF

The Information Technology and Innovation Foundation (ITIF) is an independent, nonprofit, nonpartisan research and educational institute focusing on the intersection of technological innovation and public policy. Recognized by its peers in the think tank community as the global center of excellence for science and technology policy, ITIF's mission is to formulate and promote policy solutions that accelerate innovation and boost productivity to spur growth, opportunity, and progress.

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