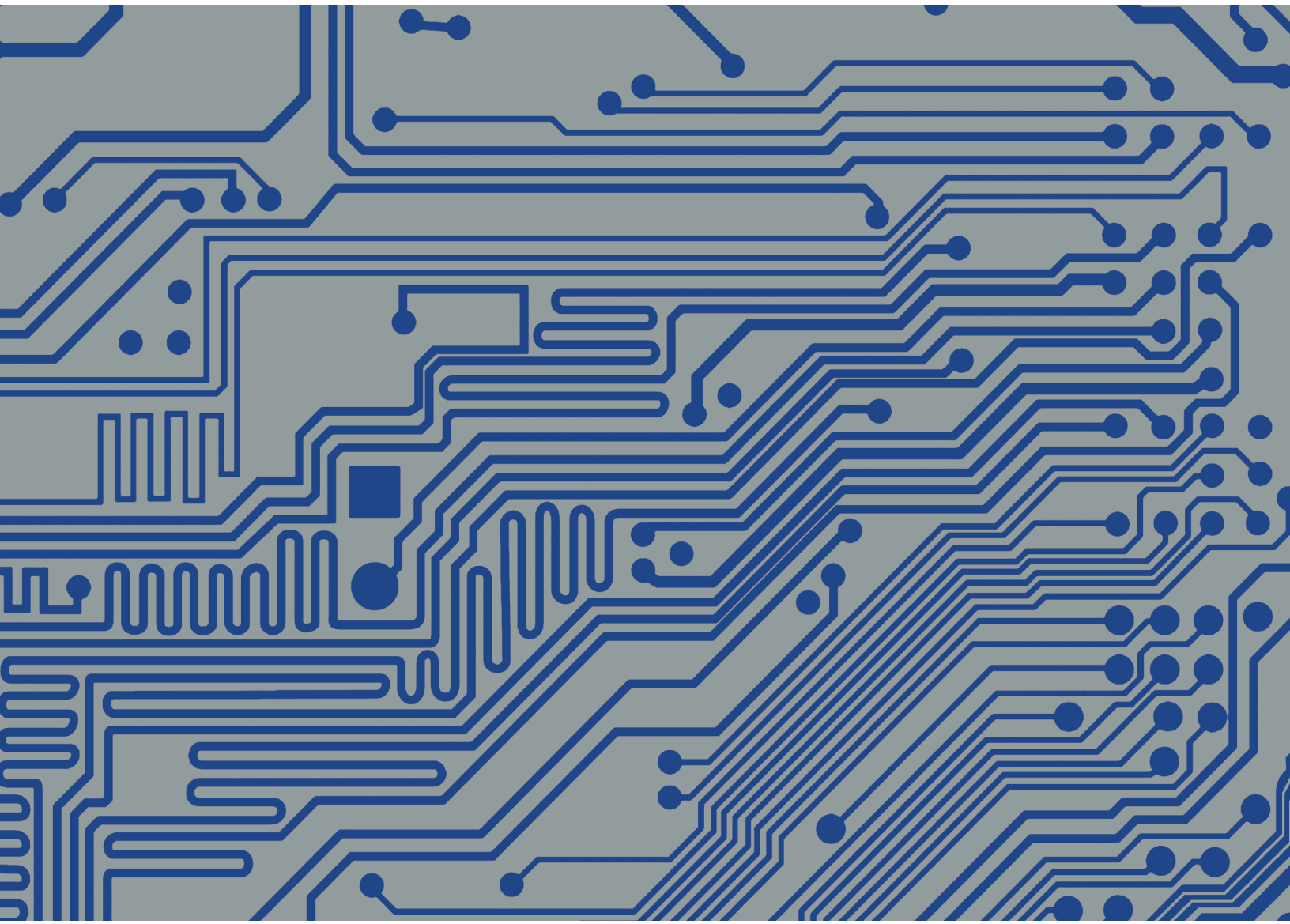
HIGH TECH: The Next Wave of Chinese Investment in America

BY THILO HANEMANN AND DANIEL H. ROSEN

Asia Society®



SPECIAL REPORT

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Asia Society Northern California
500 Washington Street, Suite 350
San Francisco, CA 94111
Phone: 415-421-8707
Fax: 415-421-2465
Email: sanfrancisco@asiasociety.org
www.asiasociety.org/centers/northern-california

ABOUT THE AUTHORS

Thilo Hanemann is Research Director at Rhodium Group and leads the firm's cross-border investment work. His research assesses new trends in global capital flows, related policy developments, and the political and commercial dynamics of specific transactions. One of his areas of expertise is the rise of emerging economies as global investors and the implications for host economies and the global economy. His most recent work focuses on the evolution of China's international investment position and the economic and policy implications of this new trend. Mr. Hanemann is a frequent speaker and commentator on China's outward investment and has published numerous articles on the topic. He coauthored Rhodium Group's authoritative reports on Chinese investment in the United States (*An American Open Door? Maximizing the Benefits of Chinese Foreign Direct Investment*, 2011) and Europe (*China Invests in Europe: Patterns, Impacts and Policy Implications*, 2012) and is responsible for managing Rhodium Group's China Investment Monitor.

Daniel H. Rosen is cofounder and China Practice Leader at Rhodium Group. Mr. Rosen is a Visiting Fellow at the Peterson Institute for International Economics in Washington, D.C., with which he has been affiliated since 1993, and an Adjunct Associate Professor teaching graduate courses at Columbia University's School of International and Public Affairs since 2001. From 2000 to 2001, he was Senior Advisor for International Economic Policy to the White House National Economic Council and National Security Council, where he played a key role in completing China's accession to the World Trade Organization. Mr. Rosen is a Member of the Council on Foreign Relations and serves on the Board of the National Committee on U.S.–China Relations.

Rhodium Group combines policy experience, quantitative economic tools, and on-the-ground research to analyze disruptive global trends. Its work supports the investment management, strategic planning, and policy needs of the financial, corporate, government, and not-for-profit sectors. Rhodium Group has offices in New York and California and associates in Washington, Shanghai, and New Delhi. (http://www.rhg.com)

The China Investment Monitor is an interactive online tool developed by Rhodium Group that allows users to track Chinese direct investment transactions in the United States by state and by industry. It is updated on a quarterly basis, along with public notes discussing the most important deals and policy trends. (http://rhg.com/interactive/china-investment-monitor)

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FOREWORD

SEVERAL YEARS AGO, it became evident that the world was on the cusp of a significant shift in patterns of global foreign direct investment (FDI). China, which had been a major recipient of inflows from the developed world, was poised to become a more active investor in mergers, acquisitions, and greenfield projects abroad. Therefore, the Asia Society undertook the first of a series of studies to map this shift and to suggest how these new investment flows, might benefit the United States while also enhancing U.S.–China relations.

The first study, *An American Open Door? Maximizing the Benefits of Chinese Foreign Direct Investment* (2011), was written by Rhodium Group's Daniel H. Rosen and Thilo Hanemann (as were subsequent joint efforts). It examined Chinese investments in the United States, prospects for their growth, potential benefits and risks, and obstructions to even greater flows in the future. Our conclusion was that flows of Chinese capital into the United States—the most open and vibrant economy in the world—were on the precipice of growing dramatically. We also concluded that in spite of political concerns, the United States had much to gain by encouraging even greater inflows from China.

The second study, *Chinese Direct Investment in California* (2012), was premised on the recognition that because the West Coast of the United States has a long tradition of involvement with China and the Pacific, it has a much greater at stake in how future patterns of Chinese investment move around the world. With that in mind, we focused on the current state of Chinese FDI in California, the risks and benefits of such investment, and recommendations for encouraging even larger flows in the future. The report helped the state of California reconsider how to enhance its relations with China and, ultimately, paved the way for Governor Edmund G. Brown, Jr., to lead a successful delegation to China in March 2013. His trip catalyzed not only new investment projects but also a series of important subnational exchanges and collaborations.

Drilling even more deeply into the U.S.-China relationship, the Asia Society's Northern California Center is pleased to present a third report, *High Tech: The Next Wave of Chinese Investment in America*, which examines Chinese direct investment in America's high-tech sector—an area that is particularly interesting to Chinese investors because of its distinctively innovative spirit, dynamism, and extraordinary success. The challenge of this study was to analyze the current level of Chinese involvement in U.S. high-tech sectors and to make recommendations on how to improve the investment climate and pave the way for mutual gains by both economies.

Although there are some cases in which Chinese investments poses national security challenges, this is not the case in the vast majority of transactions. It is our hope that this survey will help delineate not only areas where caution is advised but also others where more activity will benefit both countries. In this way, America's high-tech sectors—particularly in states such as California, which has always been a pace-setter—can become a model for closer two-way U.S. investment links with China.

Orville Schell
Arthur Ross Director, Center on U.S. China Relations
Asia Society

Jack Wadsworth
Advisory Director, Morgan Stanley
Co-Chair, Advisory Board, Asia Society Northern California

N. Bruce Pickering
Vice President of Global Programs, Asia Society
Executive Director, Asia Society Northern California

AUTHORS' ACKNOWLEDGMENTS

THIS REPORT IS THE THIRD COLLABORATION between Rhodium Group and the Asia Society on Chinese investment in the United States. We are grateful to the Asia Society for its enthusiasm, encouragement, and support of our work on Chinese outbound investment, especially to Orville Schell at the Center on U.S.–China Relations and President Josette Sheeran. We owe particular thanks to Jack Wadsworth, who, in addition to his involvement as a board member of the Asia Society and a cheerleader for research on U.S.–China investment flows, continues to share his ongoing experience, contacts, and wisdom, as well as his warmth and encouragement.

For this study, we would especially like to thank Bruce Pickering of the Asia Society Northern California (ASNC) Center, who initiated this project and supported us throughout. We are indebted to Robert W. Hsu, Robert Bullock, Maria Scarzella-Thorpe, Wendy Soone-Broder, and the rest of the ASNC team for their administrative support and useful feedback on our drafts. We also want to thank the sponsors of the report: Deloitte, Silicon Valley Bank, Wells Fargo, Jack Wadsworth, Blank Rome LLP, and East West Bank.

The participants in three study groups in San Jose (December 10, 2013), San Francisco (December 11, 2013), and Washington, D.C. (December 13, 2013), provided useful reactions and comments on early drafts of the report. We benefited greatly from discussions with a wide range of individuals in the United States and China in the private sector, government organizations, and academia.

We owe a debt of gratitude to a number of fellow economists at the Peterson Institute for International Economics who have worked on the larger topic of foreign direct investment in the past, including Ted Moran and Monty Graham (1944–2007). Finally, special thanks go to our colleagues at Rhodium Group in New York City for their superb research and administrative support.

While all of these people improved our work, imperfections surely remain, which are solely the responsibility of the authors.

Thilo Hanemann, Daniel H. Rosen
New York, March 2014

EXECUTIVE SUMMARY

WHILE CHINA STARTED INVESTING AROUND THE WORLD in the early 2000s, the first waves of Chinese overseas investment targeted mostly extractive mining activities in developing countries and resource-rich advanced economies such as Australia and Canada. Over the past five years, however, Chinese capital has begun to flow into non-extractive sectors in advanced economies, increasingly targeting technology- and innovation-intensive industries.

Initially, the surge of Chinese outward foreign direct investment (OFDI) in the United States largely responded to opportunities in energy and real estate, but access to technology and innovation is now becoming an important driver. In the first quarter of 2014 alone, Chinese investors announced high-tech deals worth more than $6 billion, including the takeovers of Motorola Mobility, IBM's x86 server unit, and electric carmaker Fisker.

China's arrival as a technology investor brings benefits to the United States, but it also reinforces concerns, particularly at a time of difficult U.S.–China relations in technology. The United States blames China for technology theft and failed international trade negotiations; China, for its part, still follows discriminatory industrial policies and is contemplating a more nationalistic approach to technology in light of recent electronic surveillance revelations.

In this report, we explore the advent of Chinese investment in U.S. high-tech sectors in order to provide an objective starting point for debate about this nascent trend. We use a unique dataset on Chinese FDI transactions in the United States to describe the patterns of Chinese FDI in U.S. high-tech sectors, elaborate on the firm-level drivers of those investments, and present an initial assessment of the impacts from a U.S. perspective. We then identify the most important impediments to two-way U.S.–China high-tech investment flows and present recommendations for policy makers and businesses on both sides to address these stumbling blocks.

We believe that growing Chinese outbound high-tech investment is an important determinant of the path forward for U.S.–China relations in general. Successful Chinese investments will make Americans recognize the potential benefits of greater economic integration with China through two-way investment flows and remind Chinese leaders that openness and convergence with a market-based innovation approach is in China's own interest. A negative U.S. response to growing Chinese investment will aggravate existing tensions and give encouragement to proponents of a more nationalistic and discriminatory approach to technology, triggering a backlash against foreign firms in China and risking a protectionist downward spiral.

Patterns

Chinese FDI in the United States has evolved from trade facilitation (in the 1990s) and resource extraction (starting in the mid-2000s) to investment in high-tech manufacturing and advanced services. Using a broad subset of 15 high-tech industries, we show that Chinese interest in these industries was minimal before 2010, with the exception of Lenovo's acquisition of the IBM personal computing unit in 2005. Since 2010, annual deal value has topped $1 billion every year. In 2012 and 2013, growth stalled, along with a general drop in number of FDI transactions, but 2014 will be a breakthrough year, with deals worth more than $6 billion pending in the first quarter alone.

Despite this recent surge, cumulative investment from China in U.S. high tech remains modest by any measure. By the end of 2013, cumulative Chinese investment in these 15 industries amounted to $9.1 billion—about one-fourth of total Chinese FDI in America in this period, or about half of what Facebook offered to pay for the acquisition of messaging start-up WhatsApp in February 2014. Within the high-tech industries, the trend has shifted from mostly electronic equipment, machinery, and auto parts in earlier years to a much broader mix of industries, including new energy, aviation, and biotechnology. Chinese high-tech investments are spread across 37 states, with California and states with particular innovation clusters receiving the most investment. Chinese firms investing in U.S. high-tech sectors are mostly private enterprises that have a global footprint and are located in China's most developed provinces.

Motivations

China's recent OFDI boom is driven by a mix of policy liberalization and changing commercial realities in the Chinese marketplace, which are forcing firms to expand beyond China's borders. To illustrate the changing motivations for such investments at the firm level, we reviewed all 518 transactions in our sample of high-tech deals. We find that trade facilitation was initially the most important driver of Chinese FDI in technology-intensive industries, mostly in the form of smaller-scale projects such as sales offices. As their goods become more technologically advanced, firms are now investing in more sophisticated and expensive projects aimed at demonstrating capabilities and providing after-sales services. In addition to export facilitation, an increasingly important driver of Chinese high-tech FDI is the acquisition of technology, brands, distribution channels, and other strategic assets to improve long-term competitiveness. A second, newly emerging driver is the desire of Chinese firms to increase the efficiency of their global operations by tapping the talent base and advanced institutions in the United States – assets which cannot be uprooted and removed to China.

Impacts

The impact of Chinese investment in high-tech industries is the subject of intense debate. The track record of Chinese firms in the United States is too short to fully assess the validity of concerns, but our research allows us to present some important data points and anecdotal evidence.

The first major concern is that China's economic size, combined with nonmarket advantages its firms sometimes possess, could threaten the healthy functioning of competitive markets in the long-term. We find that the impact of Chinese FDI on competition in high-tech industries is still small but largely positive to date. Chinese firms such as Haier, Lenovo, Tencent, and Alibaba are increasing choices and lowering prices for consumers. Greater Chinese FDI also increases the competition for assets, thus allowing U.S. producers to divest unwanted assets at a higher price, as the examples of IBM's x86 server unit and Google's Motorola unit illustrate. Concerns about the distortion of asset prices in the aggregate by new Chinese investment entrants are for the time being unwarranted, given the small market share of these firms. However, the concerns of individual firms about the subsidies and other nonmarket advantages enjoyed by Chinese firms now entering the competition for global technology assets or overseas market share are understandable and legitimate, and need to be addressed.

A second concern is that China's industrial policies and state controls could incentivize its firms to acquire U.S. assets in order to move innovation-intensive activities back to China, hollowing out American capabilities. Analyzing our sample of Chinese investments, we find no signs that industrial policy goals or patriotic doctrines are forcing firms to move innovation operations back to China against commercial logic. To the contrary, Chinese high-tech investors have created or sustained 25,000 jobs in the United States and are becoming significant contributors to research and development investment. The primary value proposition for most Chinese investors is not a quick grab of patents or other removable physical assets but intangible and non-removable assets such as the skills and know-how of staff, management experience, brands, and proximity to local customers.

Third, Chinese FDI does evoke particular concerns about national security impacts because of China's size, its role as geopolitical competitor, and its troubled track record in the proliferation of sensitive technologies to hostile regimes such as North Korea. These concerns are also legitimate and warranted. At the same time, the existing screening system of the Committee on Foreign Investment in the United States (CFIUS) allows the United States to sufficiently mitigate risks or block investments with potential negative impacts on security.

Impediments

Concerns in the United States about Chinese high-tech OFDI and existing distrust and calls for de-Westernization of technology in China could contribute to a dangerous turn toward techno-nationalism. We identify three areas where policy makers and private sector players—both in China and the United States—must work to sustain healthy and open two-way U.S.–China investment flows.

First, national security concerns have hampered a number of deals and led to politicization of others in the US. In China, national security concerns have recently triggered a debate about reducing reliance on foreign technology and spurred certain groups to lobby for a more nationalistic approach to innovation. Therefore, the first and foremost challenge to safeguarding productive and mutually

beneficial U.S.–China investment flows is to ensure that national security concerns are managed appropriately and that regimes are not abused for protectionist or other special interests.

A second impediment is debate over the nonmarket elements in China's economy and asymmetries in market access. Concerns about the "unfair advantages" enjoyed by Chinese firms in global competition, a lack of reciprocity in market access, and industrial policy biases have been voiced in connection to almost every Chinese high-tech acquisition in the United States. Such concerns have already led to new rules in some of China's partner economies (for example, Canada and Australia), and there are calls in the United States to expand the scope of CFIUS or to erect new regimes to screen for potential economic threats from Chinese investment. Resolving these concerns is essential to a sustainable U.S.–China investment relationship.

A third threat to open U.S.–China investment flows and the globalization of innovative activities generally is uncertainty about the distributional impacts and benefits from such processes. Therefore, it is critical to take the right steps for both countries to be confident about the economic benefits from an internationalist approach, rather than a nationalist approach, to technology value chains.

Recommendations for U.S. policy makers and businesses

1. Acknowledge China's arrival as high-tech investor: Many policy makers struggle to imagine that Chinese firms could become major contributors to local innovation. As our data show, they already are. Governors and mayors need to do their homework and craft strategies for attracting investments in their local economies. The U.S. business community will also have to carefully consider the opportunities and challenges of this shift in Chinese investment interests for their operations at home and abroad.

2. Ensure that national security screening remains effective: For decades CFIUS has fulfilled its mandate well: screening for narrowly defined national security concerns in inward acquisitions so as to clear the way for general openness to foreign investment flows. The rise of high-tech investments from China reinforces the need for a gatekeeper that establishes confidence that openness to China entails no unmanageable risks. At the same time, rapid growth in China-related deal flow also raises the risk that deals are politicized and that the narrow standard of what constitutes a legitimate national security concern may widen. Such risks should be headed off by clear guidance from the President, greater transparency about technology-related concerns, and better disclosure of procedures and results.

3. Reassess other investment-relevant elements of U.S. security policy: The emergence of investors from emerging markets and the growing complexity of global innovation value chains highlight the need to evaluate other elements of U.S. national security policy. One area is the U.S. export controls regime, which has been a drag on the global competitiveness of U.S.-based firms for a long time and will put U.S. locations at a disadvantage in competition with European or Asian economies for legitimate greenfield investments from China. A second area is market access

restrictions for Chinese technology goods, which may be necessary and legitimate, but they need to be narrow, codified, and transparent to avoid retaliation against U.S. companies.

4. Utilize domestic frameworks to address economic and commercial concerns: Instead of expanding CFIUS reviews to "economic security" questions or erecting a new burdensome at-the-border regime, the U.S. should use its ample domestic regimes—including competition policy or trade secrets laws— to address economic concerns such as unfair competition. The greater physical presence of Chinese firms will also give U.S. companies a greater ability to use the U.S. court system for pursuing their interests in technology-related disputes with Chinese firms, such as copyright and intellectual property rights (IPR) violations.

5. Push for a bilateral investment treaty and international regimes to incentivize upward convergence: A bilateral investment treaty between China and the United States will not level the playing field overnight, but it could provide a detailed template for improving China's inward FDI regime and testing China's degree of readiness. At the same time, the United States should continue its leadership on international agreements addressing market access, IPR protection, and transparency, such as the Transatlantic Trade and Investment Partnership, the Trade in Services Agreement, and the well-advanced Trans-Pacific Partnership. If reforms in China fall short of expectations, then such international investment covenants will serve as a safety net for market economies and an incentive for convergence.

6. Tackle reforms to ensure long-term U.S. competitiveness in innovation-intensive activities: The United States is attractive to Chinese firms because it is the world leader in many cutting-edge technologies and offers firms the right institutional environment and highly qualified and educated workers. The way to keep these firms in the United States and attract more of them is to sustain these advantages and make America a more attractive place for knowledge-intensive activities than its peer competitors in Europe or Asia. Barriers to foreign investment will do little to improve American competitiveness—in fact they could easily impair it further.

Recommendations for Chinese policy makers and businesses

1. Acknowledge foreign concerns: American anxieties about the character of China's behavior in the context of global innovation are not surprising, given Beijing's extensive official indigenous innovation programs couched in nationalistic terms, talk of "de-Westernizing" Chinese technology, recent setbacks in an expanded Information Technology Agreement as a result of Chinese foot-dragging, and a history of aggressive technology theft by Chinese firms both at home and abroad. Historically, China is not unique in any of these blemishes, but if Chinese leaders and firms want to optimize market access abroad today, the onus is on them to change these perceptions.

2. Make a down payment on broad market reforms: The aggressive economic reform program laid out by the Third Plenum of the Communist Party in November 2013 is a big step forward, but uncertainty remains about what path the leadership intends to take on innovation and technology. By

making a "down payment" on reform, Beijing can demonstrate what kind of future foreign partners can expect and make it easier to get past current misgivings about high-tech OFDI. Examples of confidence-building moves with regard to innovation include lower barriers to foreign participation in technology and service sectors in China or the abolition of nationality-based discrimination in technology-relevant industrial policies.

3. Take bolder steps on China's inward FDI regime: A prime determinant of foreign appetite for Chinese FDI in technology is the treatment of foreign firms in China. The faster China moves from the current approval system to a modern FDI regime, the more easily U.S. leaders and businesses can advocate for reciprocal openness. Within this new regime, the list of restricted sectors should be narrow and transparent, and informal barriers should be minimized. A revised and radically slimmed down negative list of sectors to be exempted from general openness, both in the context of the new Shanghai Free Trade Zone and the US-China BIT negotiations, is the singular indication of boldness that foreign observers are looking for at this point.

4. Unleash the private sector: China has made great strides in the transition from a government-dominated economy to a market economy, and it is private firms and entrepreneurs that are now driving outbound FDI in technology sectors. However, private innovators need a better legal environment at home, as well as more freedom to make unfettered decisions about outbound investment and global operations. Conversely, China's private sector needs to step up and do a better job educating stakeholders abroad about motives and impacts of investments, and in advocating openness and a level playing field for foreign firms in China.

5. Provide greater leadership on investment-related international regime building: As the world's second-largest economy and now one of the top exporters of FDI globally, China needs to take a greater role in designing and expanding multilateral regimes that promote global investment openness. Negotiating bilateral investment agreements with the U.S. and other countries are a first step, but China could ultimately become a powerful force in the revival of a multilateral agreement on investment. China's changing global investment interests, combined with changes in the domestic political economy, should also increase the urgency for China to promote or join related international agreements, for example, the World Trade Organization's government procurement agreement and the Information Technology Agreement.

INTRODUCTION: FOREIGN INVESTMENT AND U.S. INNOVATION

THE UNITED STATES IS A WORLD LEADER in science, technology, and innovation. From its beginnings, America's status as a high-tech nation has been closely related to the inflow of foreign investment.[1] Early European innovators were major investors in U.S. high tech, especially as the Industrial Revolution gained steam, enticed by wide-open market opportunity, rapid demographic growth, and favorable regulatory and cultural environments for commercial development. By 1900, 13.2% of U.S. patents were granted to foreign citizens. As Mira Wilkins notes in her seminal study of foreign direct investment (FDI) in the United States, referring to the period before 1914,

> There seems no question that foreign direct investors in the United States served as conduits for technology transfer to America. This was true in numerous industries, from rayon to chemicals to magnetos.[2]

The "going global" strategy of firms seeking to be part of American growth continued throughout the twentieth century. Enormous positive technology spillovers for states and localities, more often than not, enhanced profits for the foreign firms as well. America's technological lead can be attributed both to the foreign firms and individuals that established operations and to the farsighted policy makers who recognized that keeping the door open to foreign investment incentivizes innovation even in cases lacking foreign entrants. Creating an attractive place for foreign multinationals to learn and perform research and development (R&D) is innovation enhancing for its own sake.

The United States continues to be the world's most attractive destination for foreign direct investment, accounting for around 17% of global FDI inflows over the past two decades and a total inward FDI stock of $2.65 trillion at the end of 2012. Investment in innovation-related activities remains high, with foreign multinationals accounting for 13% to 15% of total corporate spending on R&D in the United States.[3]

Since the mid-2000s, a new group of investors has been knocking at America's door: firms from emerging economies, chief among them Chinese enterprises. A major *destination* for global FDI since the early 1990s, China has emerged as a major *exporter* of FDI since the mid-2000s, and it now accounts for 5% of global outward foreign direct investment (OFDI) flows (2012), behind only the United States and Japan (Figure 1). While the first wave of Chinese OFDI was directed to trade facilitation and resource extraction, in recent years Chinese capital flows to developed economies have grown quickly, increasingly motivated by access to technology and markets for higher-value-added products.

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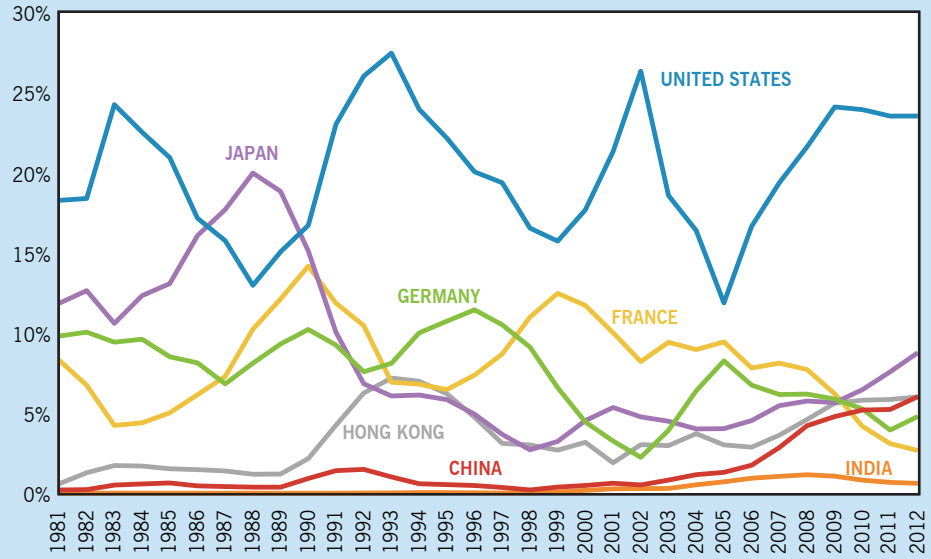
[1] The following historical review is based on the excellent work by Mira Wilkins (1989, 2004) on the history of FDI in the United States.
[2] Wilkins (1989, 177).
[3] Data from the National Science Foundation, accessed February 17, 2014, http://www.nsf.gov/statistics/seind12/c4/c4s4.htm#s1.

Figure 1: The World's Top FDI Exporters, 1981–2012
Share (%) of global outward FDI flows, three-year moving average



Source: United Nations Conference on Trade and Development.

Historically, China has not been a major investor in the United States. For the past two decades, investments from the Middle Kingdom have been mostly small in scale, low key, and export facilitation-oriented. However, these flows have recently grown substantially, from an average of less than $1 billion a year before 2008 to more than $14 billion by 2013. This growth has been driven by new extractive sector opportunities created by the U.S. unconventional oil and gas boom and by the mounting desire of Chinese institutional investors to find safe-haven investments, such as real estate and utilities. In recent years, a new set of drivers has evolved: Chinese firms in more advanced manufacturing and services are eager to grow U.S. market share and margins, acquire technology, tap the U.S. talent base, and take advantage of the legal and financial environment.

As with previous waves of foreign investment, these new investment flows have sparked a debate about impacts on both the U.S. economy and national security. As the examples of Japan and South Korea have shown, these new flows can help sustain U.S. technology leadership and local jobs and contribute to productivity enhancement in the U.S. economy. At the same time, investment from China generates fears about the loss of U.S. technology leadership, unfair nonmarket practices, and the transfer of dual-use technology to a geopolitical competitor.

Recent developments in U.S.–China relations complicate this debate. On the U.S. side, evidence of Chinese state-sponsored cyber espionage, foot-dragging on expansion of the trade-oriented Information Technology Agreement, and indigenous innovation policies and technology standards

at home have created a negative view of Chinese readiness to further integrate with a market-based global system of technology value chains. On the Chinese side, revelations suggesting systematic U.S. cyber intrusion on foreign countries have heightened awareness of vulnerability and sparked a backlash against U.S. firms in China. Beijing sees U.S. and European Union efforts to expand global technology standards as a veiled attempt to achieve protectionist aims.[4] In short, recent developments are undermining the vision of a market-based system of global innovation value chains and raising the specter of welfare- and innovation-destroying "techno-nationalism."

This report analyzes growing Chinese investment interests in U.S. technology- and innovation-intensive industries against this backdrop. Our goal is to provide a current, evidence-based depiction of these trends and their significance in order to improve public policy discourse among interested parties. Building on this initial assessment of on-the-ground facts, we offer conclusions and recommendations for both China and the United States for maintaining the benefits from growing cross-border investment-driven innovation.

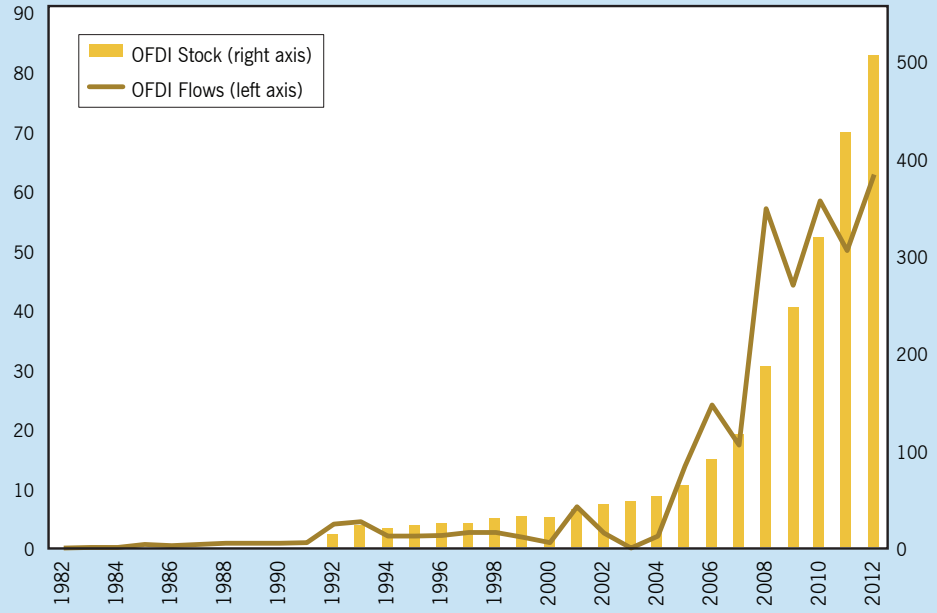
In Part I, we review the patterns of Chinese investment based on a proprietary database and analyze how much of this capital is targeted toward technology- and innovation-intensive industries. In Part II, we explore the motivations for growing Chinese investment in these industries, focusing on commercial firm-level drivers. Part III turns to the impacts of these investments on the United States and analyzes preliminary evidence for the most important questions from a U.S. perspective. In Part IV, we look at the most important roadblocks to a productive U.S.–China relationship in high-tech trade and investment and how to overcome them. The report concludes with a summary of findings and concrete recommendations for policy makers and private sector players for sustaining U.S.–China collaboration, as opposed to a scenario of techno-nationalism.

[4] On the impact of cyber espionage on U.S. firms in China, see Rosen and Bao (2013). On the Transatlantic Trade and Investment Partnership and technology standards, see "Remarks for U.S. Trade Representative Michael Froman on the United States, the European Union, and the Transatlantic Trade and Investment Partnership," September 30, 2013, accessed February 17, 2014, http://www.ustr.gov/about-us/press-office/speeches/transcripts/2013/september/froman-us-eu-ttip.

I. PATTERNS: CHINESE FDI IN U.S. HIGH-TECH SECTORS

CHINA'S WORLDWIDE OUTWARD FOREIGN DIRECT INVESTMENT has grown quickly over the past decade, from less than $3 billion in 2004 to more than $20 billion in 2006 and to more than $50 billion in 2008. In the years from 2010 to 2012, in the face of a global decline in FDI levels, China sustained an annual OFDI average of more than $50 billion, making it one of the world's top exporters of direct investment in the post–financial crisis years. By year-end 2012, China's global OFDI stock had reached $503 billion (Figure 2).[5]

Figure 2: China's Global Outward FDI Flows and Stock
$US (billions)



Sources: People's Bank of China; State Administration of Foreign Exchange (PRC); External Wealth of Nations Dataset.

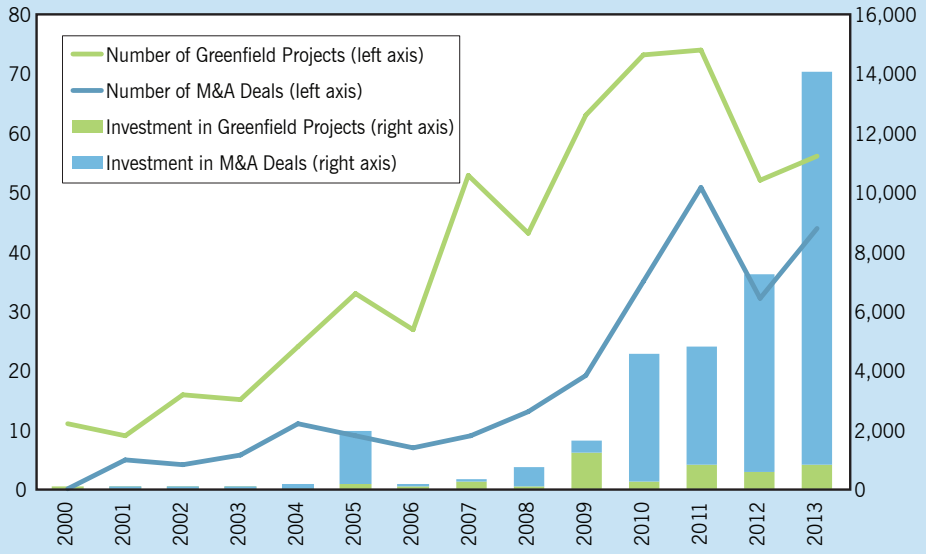
The initial boom in China's OFDI was centered on developing countries and a handful of resource-rich advanced economies, including Australia and Canada. For the most part, non-resources investments in developed economies were few and far between. That situation began to change in 2008, when Chinese direct investment in the United States and other developed countries took off significantly. Official statistics have been slow to catch up with this trend because of data

[5] The FDI figures in this paragraph are from the balance of payments statistics published by China's State Administration of Foreign Exchange. For more details on the data sources, see Data Appendix.

collection problems and complicated deal structures.[6] However, a transactions-based approach to data collection helps illustrate the sharp upturn in Chinese acquisitions and greenfield projects in the United States. Rhodium Group's China Investment Monitor (CIM), which resulted from a 2011 undertaking to analyze Chinese investment in the United States, takes such an approach.[7]

According to the CIM data, Chinese firms completed 794 deals between 2000 and 2013, worth a total of $36.1 billion (Figure 3). Before 2008, deal flows typically stood at less than $1 billion annually, with the singular exception of Lenovo's $1.75 billion acquisition of IBM's personal computing (PC) division in 2005. Since 2008, inflows have gained momentum, growing to just under $1.7 billion in 2009 and to $4.6 billion in 2010. Annual deal flow reached record highs in 2012 ($7.3 billion) and 2013 ($14.1 billion), driven largely by greater investment from private sector firms.[8]

Figure 3: Chinese FDI Transactions in the United States, 2000–2013
Number of deals and value of deals in $US (millions)



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

ANNUAL FLOWS

There is anecdotal evidence that Chinese investment in technology- and innovation-intensive industries is on the rise, but the scope of investment and its growth are difficult to quantify. There is no official breakdown for foreign investment in U.S. high-tech industries, partly because of the

[6] See summary in the Data Appendix; for more details, see Hanemann (forthcoming).
[7] See Rosen and Hanemann (2011). Rhodium Group's China Investment Monitor is available at http://rhg.com/interactive/china-investment-monitor; see Data Appendix for details.
[8] See Hanemann and Gao (2014).

lack of a generally accepted definition of what such industries are.[9] The U.S. Bureau of Economic Analysis provides statistics on R&D spending by U.S. affiliates of foreign enterprises, but those data are plagued by a significant time lag (two years) and miss large parts of Chinese flows through offshore financial centers.[10]

For this study, we rely on a subset of industries from our CIM dataset to describe Chinese investment activity in U.S. high-tech and innovation-intensive sectors. The CIM dataset is based on 26 industry categories derived from SIC (Standard Industrial Classification) codes.[11] After a comprehensive review of the most commonly used definitions for high-tech industries, we divided these 26 industries into 15 high-tech and 11 low-tech industries (Table 1). While this is a subjective and broad definition, it is largely in line with the system used by the Organization for Economic Co-operation and Development (OECD) to measure high-tech manufacturing and innovation-intensive services.[12] The most important caveat of the industry-code-based approach is that it does not allow us to distinguish between lower- and higher-value-added activities (e.g., a simple marketing office is counted the same as a laboratory as long as they are both in industries defined as high tech). We will address this by analyzing motives and activities separately in the next chapter.

Table 1: Classification of High-Tech Industries for This Report

Included	Not Included
Aerospace Equipment and Components	Farming, Logging, and Husbandry
Automotive Equipment and Components	Food Processing and Distribution
Other Transportation Equipment	Metals and Minerals
Chemicals	Consumer Product and Services
Renewable Energy	Coal, Oil, and Gas
Financial Services and Insurance	Utilities
Business Services	Hospitality and Tourism
Pharmaceuticals and Biotechnology	Entertainment, Media, and Publishing
Plastic, Rubber, and Other Materials	Real Estate
Health Care and Medical Devices	Construction Services
Industrial Machinery and Tools	Transportation Services
Electronics and Electronics Parts	
IT Equipment	
Software and IT Services	
Semiconductors	

Source: Rhodium Group. Tertiary sectors marked in blue.

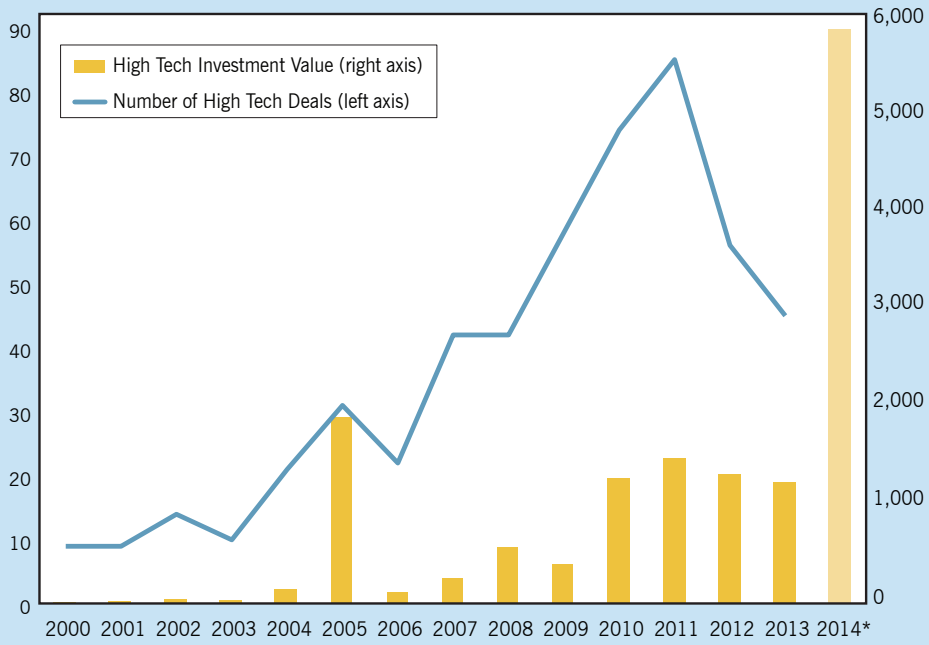
[9] For an in-depth discussion of available data on FDI and high-tech definitions, see Data Appendix.
[10] U.S. Bureau of Economic Analysis data on R&D spending of foreign firms in the United States are not compiled based on an ultimate beneficial owner (UBO) basis.
[11] See Data Appendix for CIM data compilation methodology.
[12] See Data Appendix for methodology of classifying high-tech industries.

Analyzing the deal flow in these 15 industries for 2000–2013, we see an increase in both the number of transactions and total investment value since 2009 but a notable stall in the growth trend for the past two years, 2012 and 2013 (Figure 4). That downturn is all the more significant in light of the sustained growth in overall Chinese FDI in the United States over those years; in other words, there was a marked divergence in pattern between high-tech and non-high-tech Chinese FDI over the past two years. While at first blush it is tempting to jump to the conclusion that the United States is letting low-tech investment in and shutting down activity in higher-technology space, we stress that that likely is not the case, for two reasons. First, we cannot overstate the fact that we are starting from an extremely low base of activity, and even the difference of one or two mid-sized deals stalling for purely commercial reasons can alter the trend line significantly at this stage. The structural story is one of growing Chinese activity, regardless of the short-term blips. This is demonstrated by our second point: that 2014 already looks set to become a breakthrough year in terms of deal value, with transactions of almost $6 billion announced or completed in just three months—greater than the combined total for 2009–2013.[13]

Figure 4: Chinese FDI Transactions in U.S. High-Tech industries, 2000–2013

Number of deals and value of deals in $US (millions)

*2014 figure based on deals closed and pending in Q1.



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

[13] Closed transactions include MicroPort Scientific's purchase of Wright Medical's OrthoRecon business for $290 million; pending transactions include Lenovo's acquisition of IBM's low-end server business for $2.3 billion, Lenovo's acquisition of Motorola Mobility assets from Google for $2.9 billion, Shenzhen Hepalink Pharmaceutical's takeover of Scientific Protein Laboratories for $338 million, and Wanxiang's acquisition of electric carmaker Fisker for $149 million.

The level of annual transaction value in high-tech industries was negligible before 2007, except for a spike in 2005, which was entirely attributable to Lenovo's $1.75 billion acquisition of IBM's PC unit. Between 2007 and 2009, the number of transactions and total deal value began to rise but stayed below $500 million per year on average. Since 2010, annual deal value has topped $1 billion every year, peaking at $1.5 billion in 2011. The drop in number of deals in 2012–2013 was in line with the overall trends in FDI from China, while the larger average value of deals kept annual deal value above the $1 billion mark throughout that period.[14] As opposed to overall OFDI, large-scale transactions over $1 billion were notably absent in high-tech industries, with the exception of the 2005 Lenovo-IBM PC takeover, until the present 2014 spike.

Despite the recent surge, cumulative investment from China in U.S. high tech remains modest by any measure. By the end of 2013, cumulative Chinese investment in these 15 industries amounted to $9.1 billion, or about one-fourth of total Chinese inflows in 2000–2013. To put the cumulative sum in perspective, $9.1 billion is less than half of Twitter's market capitalization in November 2013 or about a quarter of Microsoft's bid for Yahoo! in 2008. Even if we add the $6 billion in transactions announced in the first quarter of 2014, the total amount of Chinese FDI in U.S. high-tech industries is still less than what Facebook offered to pay for the acquisition of messaging start-up WhatsApp in February 2014.

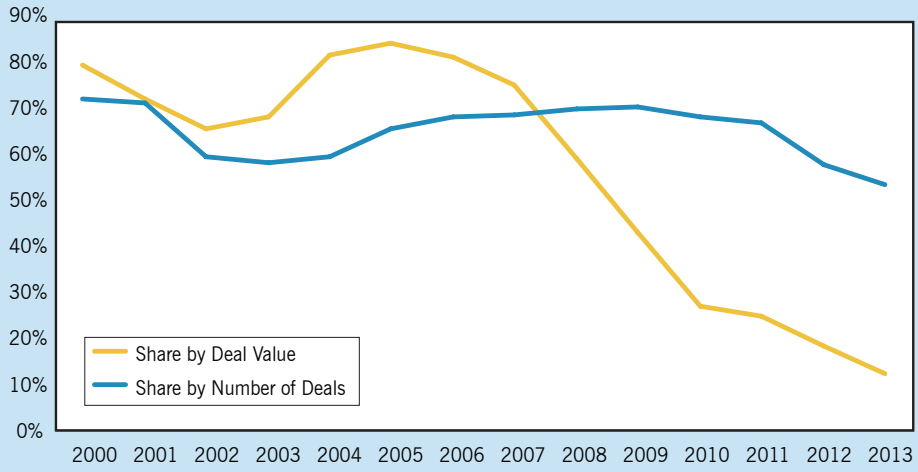
Compared to all Chinese FDI activity in the United States, deals in these 15 industries accounted for 60% to 70% of total transactions over the most of the past decade (Figure 5). In value terms, though, the share of 15 high-tech industries dropped from more than 70% in the mid-2000s to less than 20% in 2009–2013. This relative decline is attributable to an increase in capital-intensive investment projects in non-high-tech sectors such as resource extraction (unconventional oil and gas), real estate, and non-tech consumer products (such as food). The absolute decline in the past two years, especially after prior years of growth, demonstrates awareness of the technical challenges of operating in an advanced economy like the United States, the hurdles that Chinese private sector firms face in financing and approvals for outbound investment, and the potential national security complications in the United States that larger-scale transactions face.

One important difference between overall FDI activity and FDI in high-tech sectors is that the share of greenfield projects is higher on average in the sample of high-tech transactions; greenfield projects account for 71% of transactions (compared to 66% in the other 11 industries) and 21% of total investment value (compared to only 10% in the others). This suggests that higher-value-added industries attract more greenfield projects, such as R&D facilities, learning centers, manufacturing and distribution facilities, and headquarters, which are usually seen as more beneficial in terms of job creation.

[14] The number of transactions in 2013 will likely be revised upward, as smaller-scale greenfield operations are often identified only with a certain time lag. For updates, see the China Investment Monitor website at http://rhg.com/interactive/china-investment-monitor.

Figure 5: Share of High-Tech Industries in Total Chinese FDI Transactions in the United States, 2000–2013

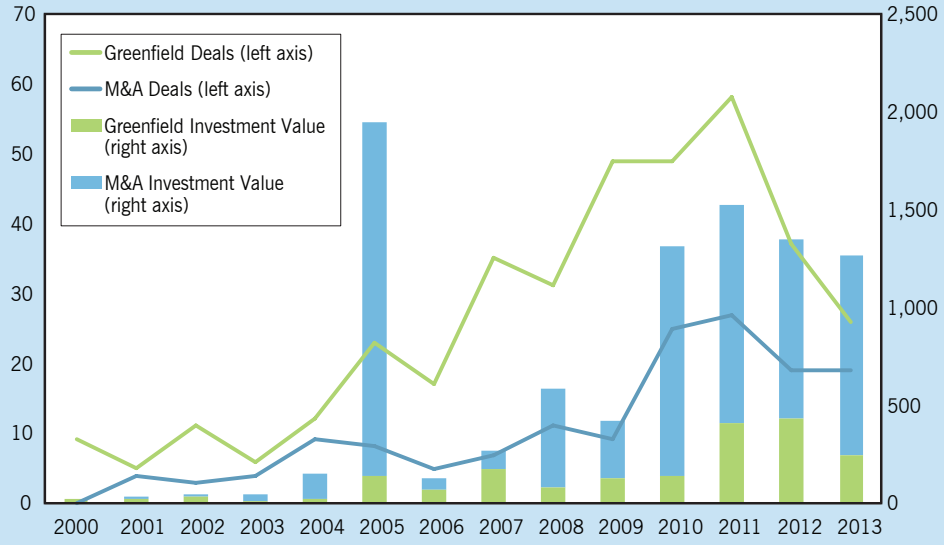
Share (%) of total, three-year moving average



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Figure 6: Chinese FDI Transactions in U.S. High-Tech Industries by Entry Mode, 2000–2013

Number of deals and value of deals in $US (millions)



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Box 1: Other Channels of Chinese Investment in U.S. High Tech and Innovation

This report focuses on **direct investment** from China in U.S. innovation-intensive industries. A direct investment relationship is commonly defined by a long-term investment that gives the investor significant control over the invested company. The Rhodium Group dataset used for this report assembles information on Chinese greenfield projects, joint ventures, and acquisitions in the United States with a total value of more than $500,000 and a final ownership stake of 10% or more (for more details, see Data Appendix). Other channels for Chinese investment in U.S. high-tech industries are not covered here, but there is anecdotal evidence that these flows are increasing rapidly as well.

Chinese investors have increasing access to smaller equity stakes in U.S. tech companies, either through public markets or privately negotiated transactions. Such **portfolio investment** transactions are impossible to track accurately, unless they are significant investments that are announced voluntarily or through mandatory regulatory filings. But anecdotal evidence illustrates that Chinese investors have become more active in recent years. In 2010, for example, China Investment Corporation disclosed holdings of equity in U.S.-listed companies valued at a total of $9.63 billion, including small stakes in American International Group, Apple, Pfizer, and News Corp.[15] There are also Chinese firms buying smaller equity stakes for investment diversification, strategic learning, or preparation for a more significant stake. Chinese e-commerce giant Alibaba, for example, recently acquired minority stakes in several U.S. e-commerce companies.[16] There are also signs of increasing activity by Chinese private equity firms in the United States, which does not count as FDI if the stakes are below the 10% level. In California, recent investments have been focused on venture capital in high-tech start-ups. China's ZPark Venture Fund, for example, recently invested in two California technology firms, health care IT firm HealthCrowd and mobile security company Trustlook.com.[17]

Another channel is the purchase of **debt instruments** and the provision of **loans** by Chinese entities to U.S. tech companies. Chinese banks have recently stepped up their cross-border lending activities and have begun to provide loans to projects and firms in the United States. For example, Bank of China took part in a $1.4 billion syndicated loan to Zimmer Holdings, a medical device company. China Construction Bank has lent to General Electric, and Industrial and Commercial Bank of China has provided credit to Walmart, UPS, Pfizer, and Dell. In 2012, two Chinese banks, China Merchant Bank and Bank of China, participated in a $6 billion syndicated loan to Duke Energy, a North Carolina–based energy group.[18]

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[15] Dinny McMahon, "CIC Offers Glimpse Into U.S. Holding," *Wall Street Journal*, February 9, 2010, accessed February 17, 2014, http://online.wsj.com/news/articles/SB10001424052748703427704575052303975503216.
[16] Arash Massoudi and Paul J. Davies, "Alibaba Extends Further into US Ecommerce," *Financial Times*, August 16, 2013.
[17] Chao Deng, "China's ZPark Venture Fund Invests in Silicon Valley Startups," Dow Jones, April 24, 2013, accessed February 17, 2014, http://pevc.dowjones.com/Article?an=DJFVW00020130424e94oakujc&ReturnUrl=http%3a%2f%2fpevc.dowjones.com%2fArticle%3fan%3dDJFVW00020130424e94oakujc.
[18] Kandy Wong, "Chinese Banks Step Up Lending in the US," *Financial Times*, August 28, 2012.

INDUSTRY BREAKDOWN

Half of Chinese high-tech investment by value is concentrated in just three of the 15 industries included in our sample: IT equipment, software and IT services, and automotive equipment and components (Table 2). However, the mix over time shows a clear evolution from a handful of core manufacturing industries in the early 2000s to a much broader set of industries and interests (Figure 7).

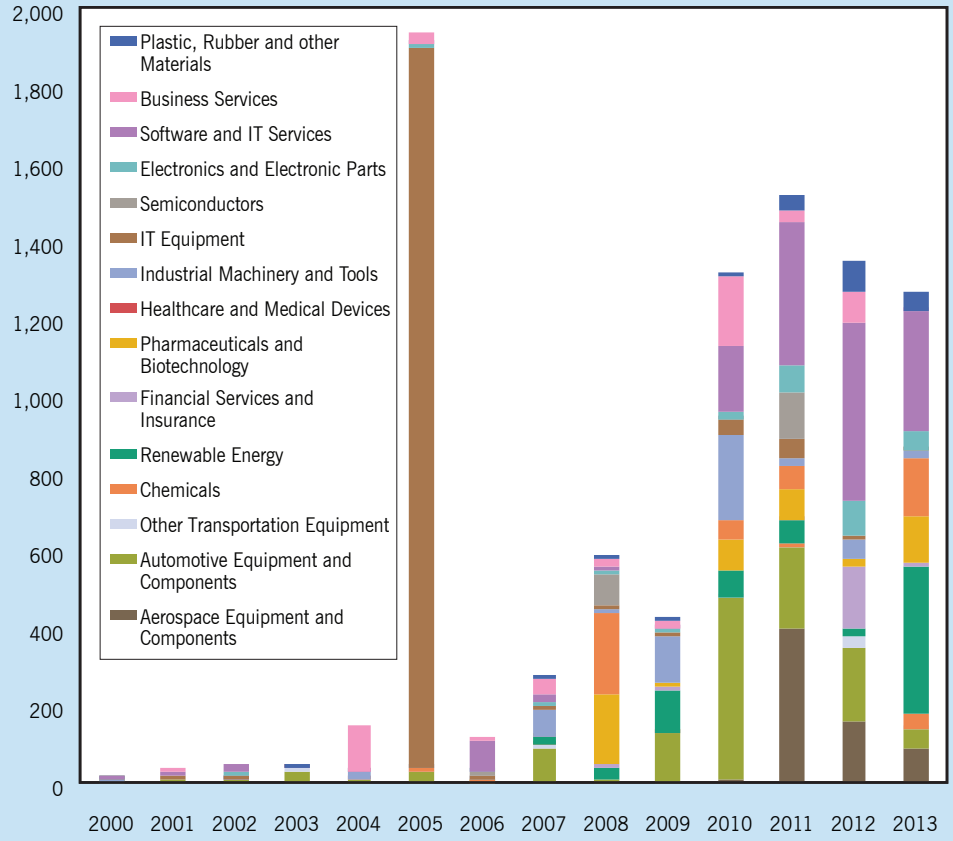
Table 2: Chinese FDI in U.S. High Tech by Industry, 2000–2013

	Number of Deals	$US (millions)
IT Equipment	46	1,997
Software and IT Services	81	1,470
Automotive Equipment and Components	71	1,238
Renewable Energy	50	699
Aerospace Equipment and Components	13	652
Industrial Machinery and Tools	61	545
Business Services	39	538
Healthcare and Medical Devices	17	491
Pharmaceuticals and Biotechnology	32	474
Electronics and Electronic Parts	49	273
Semiconductors	6	213
Financial Services and Insurance	12	205
Plastic, Rubber, and Other Materials	21	179
Other Transportation Equipment	11	56
Chemicals	9	48
Total	**518**	**9,079**

Source: Rhodium Group. Secondary sectors marked in grey and tertiary sectors in blue. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

In the first half of the 2000s, high-tech investments remained small in scale across all sectors. The first large transaction occurred in the IT equipment industry, with Lenovo's acquisition of IBM's PC unit in 2005. In 2006–2009, transactions by Chinese firms in other manufacturing sectors also grew in size, for example, automotive parts, machinery, medical devices, and renewable energy. The average size of manufacturing investments increased further in 2010 and in the following years, as firms became more confident with mergers and acquisitions (M&As) and new sectors came to the attention of Chinese investors. Examples are the acquisitions of Complete Genomics, MicroPort, Datascope, AppTec, and ZONARE Medical Systems in the health care and medical devices industry; the acquisitions of MiaSolé, Ascent Solar Technology, and Global Solar Energy in the renewable energy industry; and the acquisitions of Cirrus Industries, Teledyne Technologies, Enstrom Helicopter, Epic Air, and Glasair Aviation in the aerospace components and equipment industry.

Figure 7: Chinese FDI Transactions in U.S. High-Tech Industries by Sector, 2000–2013
$US (millions)



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

The second trend driving greater FDI inflows after 2010 is increased Chinese interest in modern and knowledge-intensive service industries, including software, finance, and business services. Deals and total investment in these sectors have taken off since 2010, as Chinese service providers have followed their customers abroad, as illustrated by the acquisition of Bank of East Asia's U.S. operations by Industrial and Commercial Bank of China and the U.S. market entry by Chinese law firms such as Dacheng and Yingke. Another major driver of greater investment in high-value-added services is that Chinese service firms are increasingly trying to tap foreign talent, technology, and brands to increase their competitiveness at home and globally. This is evident, for example, in the recent surge in takeovers in the software and IT services industry, including the acquisitions of Epic Games, Riot Games, Auctiva, Echo Lane, and Vendio.

Looking ahead to the boom year that 2014 is shaping up to be, we can already say that IT equipment will more than make up for the recent pause, mostly driven by opportunities arising from U.S. firms divesting assets that do not fit their business strategies. Renewable energy has also increased since 2013, as industry consolidation has opened up opportunities for Chinese investors to snap up distressed solar firms. Health care and pharmaceuticals have emerged as important sectors in 2013, and two significant transactions in the first quarter of 2014 signal that this trend will continue. The automotive industry is perhaps the most interesting swing case. It has shaped up to be one of the signature sectors for Chinese OFDI in Europe, with not just parts makers but whole platforms, including Volvo, Manganese Bronze, and Peugeot, embracing Chinese suitors. In the United States, Chinese investors have not taken FDI stakes in any of the major carmakers, partly because it is unclear how ambitious Chinese players could be without awakening American anxieties. As with Japan in the 1980s, large-scale Chinese greenfield investments to establish a beachhead are likely in the future, but thus far only niche players such as BYD have entered the U.S. market with their vehicles.

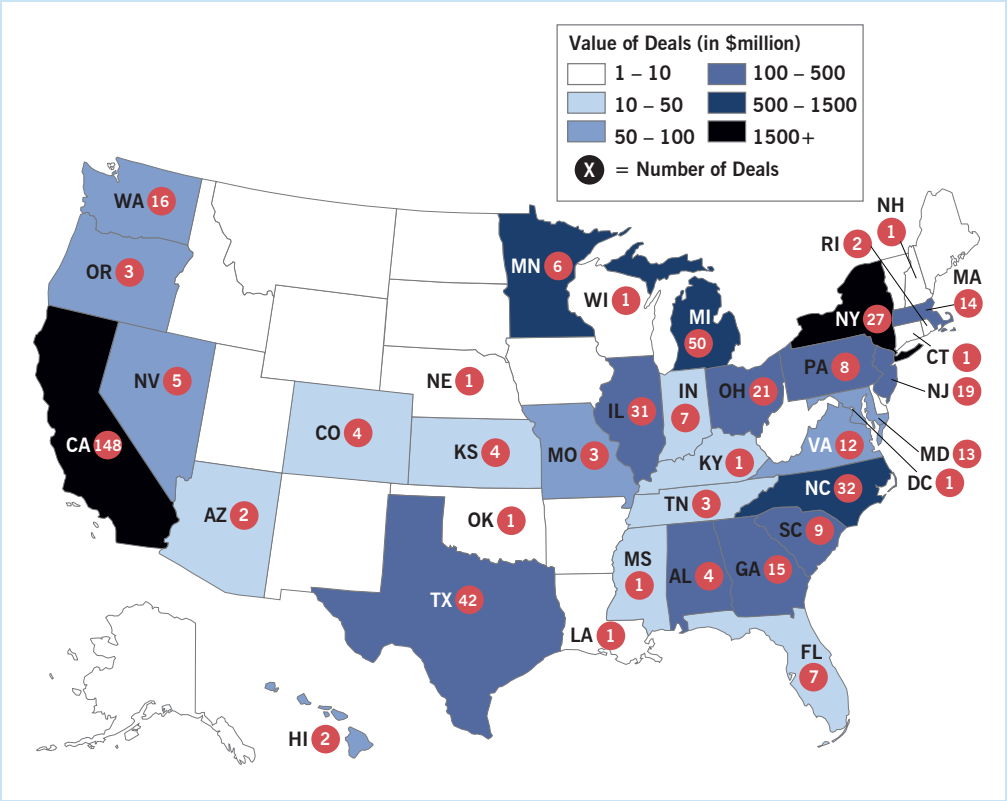
GEOGRAPHIC DISTRIBUTION

The geographic distribution of Chinese high-tech FDI in the United States follows from the industry pattern, and states with industrial clusters that match Chinese interests attract the most capital (Figure 8). California is at the forefront of Chinese high-tech investment in the United States, with the greatest number of deals (148) and the second-largest investment value ($1.82 billion). High-tech investment in California is concentrated in the software and IT equipment industry, as well as in pharmaceuticals and biotechnology (for details, see Box 2).

North Carolina is a major recipient of Chinese FDI, registering 32 deals worth more than $625 million. In fact, the Tar Heel State would have ranked first in total investment if we were not registering acquisitions by the state in which the target is headquartered (in the case of Lenovo's $1.75 billion acquisition of IBM's PC unit, this was New York, even though most employees and assets are located in Raleigh, North Carolina). In addition to Lenovo, North Carolina is home to a diverse group of Chinese companies that have set up manufacturing facilities, research centers, and sales offices, such as software and IT companies Lenovo, Huawei, and Pactera Technology; renewable energy companies Jetion Solar and Ming Yang wind power; and industrial machinery companies Masterwork, TSP Precision Tooling, Positec Tool, and Todaytec. It is notable that North Carolina almost exclusively hosts greenfield high-tech investments, which partly reflects the efforts of the state government and private organizations to promote investment and other economic and cultural ties.

Illinois and Michigan also take top spots in terms of both the number of investments (31 and 50, respectively) and total deal value ($220.8 million and $1.03 billion, respectively). In Michigan, investments from China focus almost exclusively on the automotive equipment industry. The majority (80%) of high-tech deals take the form of greenfield investments, such as factories, offices, or research centers, amid a handful of prominent acquisitions, including Nexteer Automotive and

Figure 8: Geographic Distribution of Chinese High-Tech FDI in the United States, 2000–2013
Accumulated deal value for 2000–2013, number of transactions



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Delphi Corporation's global suspension business. Investments in Illinois are also dominated by greenfield projects (77%) but exhibit a wider mix of industry distribution. Besides the automotive industry, Illinois has also attracted significant Chinese investment in industrial machinery (such as the acquisition of Goss International by Shanghai Electric) and business services (such as Yingke Law Firm's Chicago office and Bank of China's Chicago branch). Ohio is the third Rust Belt state with a significant level of Chinese high-tech investment, with most investments concentrated in the auto parts and machinery industries.

Texas has become a major host of Chinese investment in recent years, driven by growing Chinese interest in oil and gas opportunities. However, Chinese firms have also begun to invest in high-tech industries through both M&A activity and greenfield projects. Some of these investments are targeting companies in oil-related manufacturing and services, for example, engineering firms Friede Goldman or ION Geophysical. The state is also hosting offices and R&D facilities

by firms such as Huawei, ZTE, and Neusoft and has attracted acquisitions in healthcare (MD Anderson Cancer Center) and software (Catapult Systems).

New York is the top recipient of Chinese capital, not just because Lenovo's first IBM transaction was registered there, but also because it has attracted a high number of service sector transactions. Financial and business services make up one-half of all high-tech deals in the state, as many firms chose New York as a location for their North American headquarters and look for proximity to New York's financial markets. Notable Chinese companies that have set up shop in New York include Bank of East Asia, China Telecom, China Construction Bank, Industrial and Commercial Bank of China, China International Capital Corporation, and China Merchants Bank.

Massachusetts is a notable state because it has attracted Chinese investments in firms that possess cutting-edge technology. Examples include Wanxiang's investments in Great Point Energy and A123 Systems and the acquisition of Luminus Devices by Lightera Corporation. States including Alabama or Minnesota have received a significant amount of capital from China, but mostly related to one or two major transactions (Cirrus Aircraft, Continental Motors).

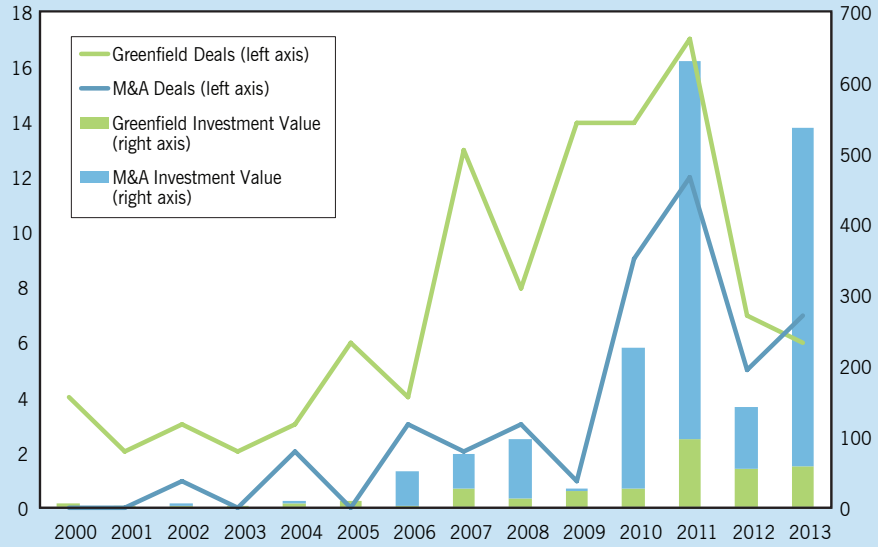
Some states still punch below their weight when it comes to attracting Chinese FDI. One example is Washington State, which hosts major U.S. innovation clusters (biotechnology, IT, and aerospace), but Chinese high-tech investment flows into Washington are relatively small both in number and value. Companies such as ZTE, Huawei, iSoftStone, and Mindray Medical USA Corp all have operations in Washington, but they remain comparably small.

Box 2: Chinese High-Tech Investment in California

California is by far the most important recipient of Chinese high-tech investment, both in terms of the number of deals (148 transactions) and investment value ($1.82 billion). The state accounts for one-fourth of all Chinese investment in our sample of 15 high-tech industries. Conversely, high-tech industries account for a much greater share of total Chinese investment in California compared to the national average. The 15 technology- and innovation-intensive industries make up 70% of all investments in California, counted by number of transactions.

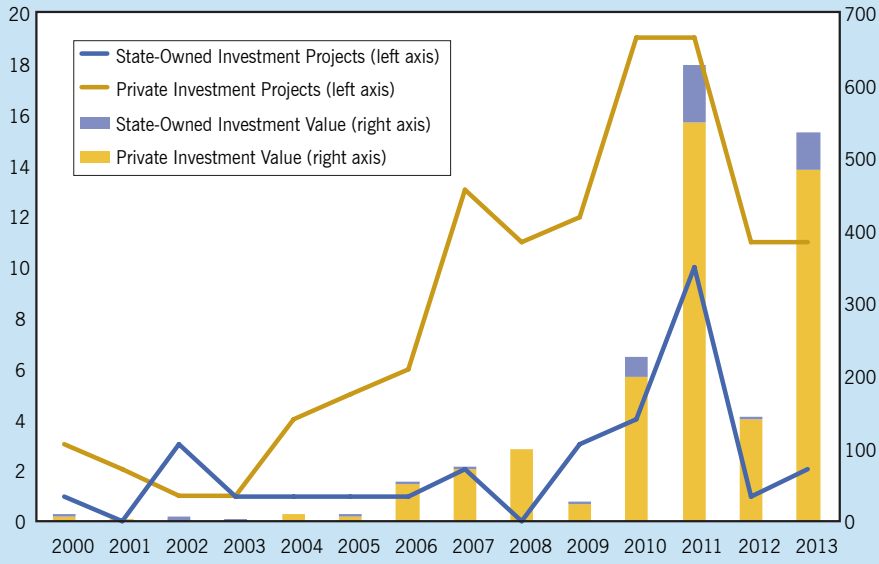
High-tech investment activity in California began to take off earlier than in other states, with around 10 transactions every year from 2006 to 2009. The years 2010 and 2011 saw strong growth in the number of investments and total investment amount, with 29 investments in 2011 worth more than $600 million. After a temporary drop in 2012, deal flow picked again in 2013, with 13 deals totaling $537 million. When broken down by entry mode, greenfield projects make up the majority of Chinese high-tech investments in California (70% of transactions), which is consistent with overall Chinese FDI in U.S. high-tech industries. The majority of greenfield projects in California are R&D centers with significant potential benefits such as employment creation and technology spillovers. It is remarkable that high-tech investments in California almost entirely come from private Chinese firms, while state-related companies account for less than 10% of total deal value.

Figure B-1: Chinese High-Tech FDI in California by Entry Mode, 2000–2013
Number of deals and deal value in $US (millions)



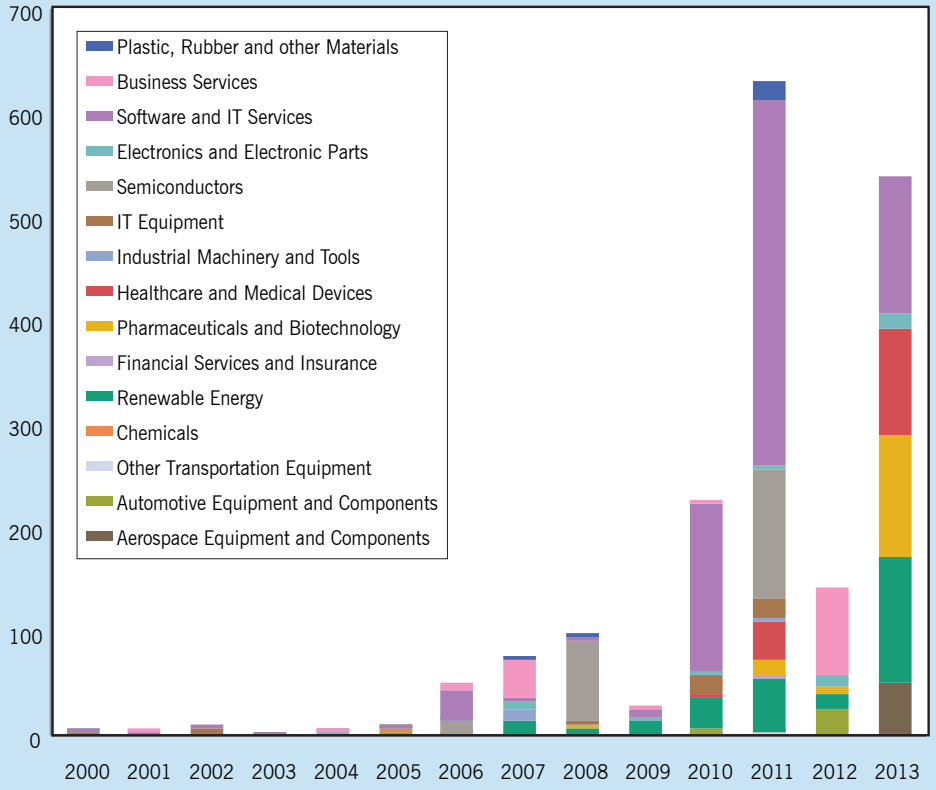
Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Figure B-2: Chinese High-Tech FDI in California by Ownership, 2000–2013
Number of deals and deal value in $US (millions)



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Figure B-3: Chinese High-Tech FDI in California by Industry, 2000–2013
$US (millions)



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

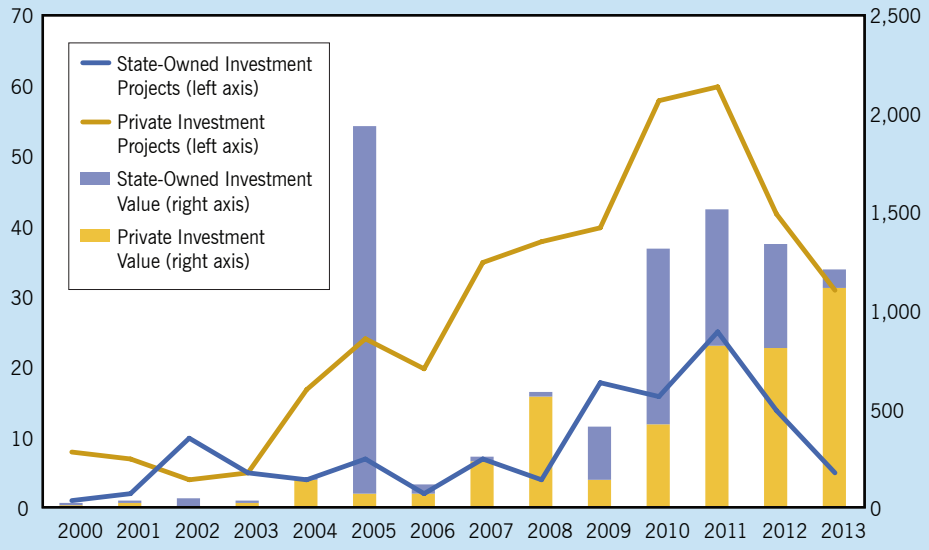
Within California, the San Francisco Bay Area is the most attractive location for high-tech investors, making up 40% of all high-tech investments in California. Los Angeles is the second major hub for Chinese high-tech FDI. Not surprisingly, the software and IT industry is the number-one attraction for Chinese firms in California. Investments in this industry make up one-quarter of all transactions, with a total of 35 deals and $694 million in total investment. In M&A transactions, Chinese gaming companies have been major buyers in the software and IT industry, such as Tencent, Shanda Games, and Perfect World. In greenfield investments, telecommunications companies such as China Telecom, China United Network Communication Group, and China Mobile were early investors in California. The next generation of Internet companies followed these pioneers, and today, most of China's big Internet firms, such as Baidu and Tencent, have R&D centers and other operations in California.

Electronics, semiconductors, and IT equipment sectors are also a significant draw for Chinese capital, with a combined 37 investments and a cumulative deal value of $318 million. Electronics and IT equipment investments in California are overwhelmingly greenfield projects—partly reflecting the human capital needs of Chinese firms. For example, Huawei built an R&D center in the Bay Area in 2012. Since 2010, we also register strong growth in the number and value of renewable energy investments from China, with 27 deals and a total investment of $252 million. Renewable energy investment in California is most concentrated on research operations and headquarters, for example, Yingli Green Energy's offices and lab facilities in San Francisco. The latest trend is growing investment interest in biotechnology, pharmaceuticals, and medical devices industries since 2010. We record 13 deals totaling $280 million Chinese investment in these industries, the majority of which are concentrated in Northern California. Examples are the acquisition of ZONARE Medical Systems and Complete Genomics, both located in Mountain View.

INVESTOR CHARACTERISTICS

As with overall Chinese FDI transactions in the United States, the majority of deals in the 15 high-tech sectors were made by private firms (76% of total deals compared to 72% of all inward FDI deals). Half of the total investment value in high-tech industries (50%) came from private firms

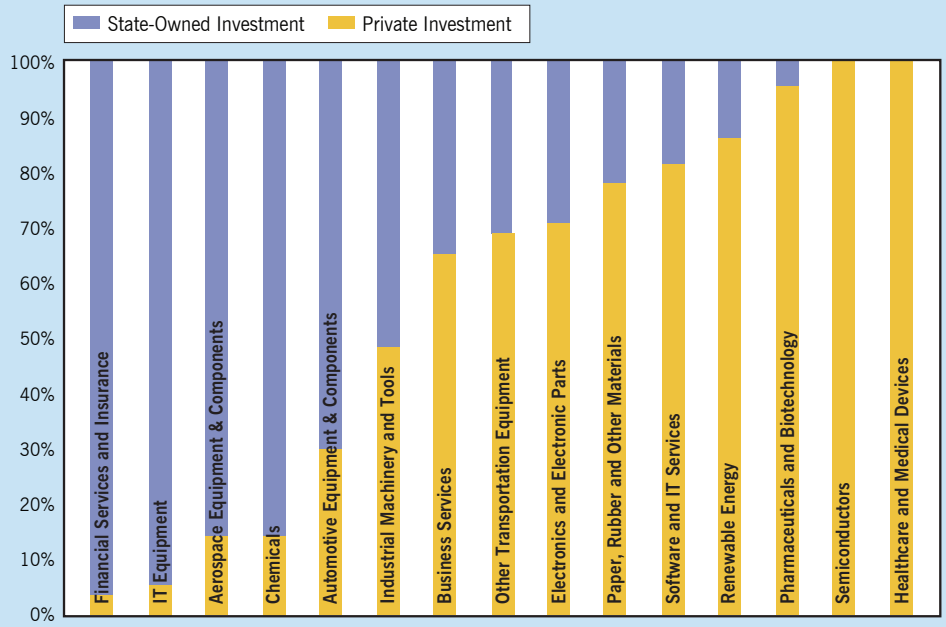
Figure 9: Chinese FDI Transactions in High Tech by Ownership of Investor, 2000–2013
Number of deals and deal value in $US (millions)



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

(which we define as being 80% or more controlled by private investors), and in 2013, this share increased to almost 90% (Figure 9). Within high-tech industries, state firms have the highest share in chemicals, aviation, financial services, and IT equipment.[19] Deals in other industries, such as pharmaceuticals, medical devices, semiconductors, and software, are almost exclusively pursued by privately owned companies (Figure 10).

Figure 10: Chinese FDI Transactions in High Tech, Ownership and Industry, 2000-2013
Share (%) in total high tech deal value

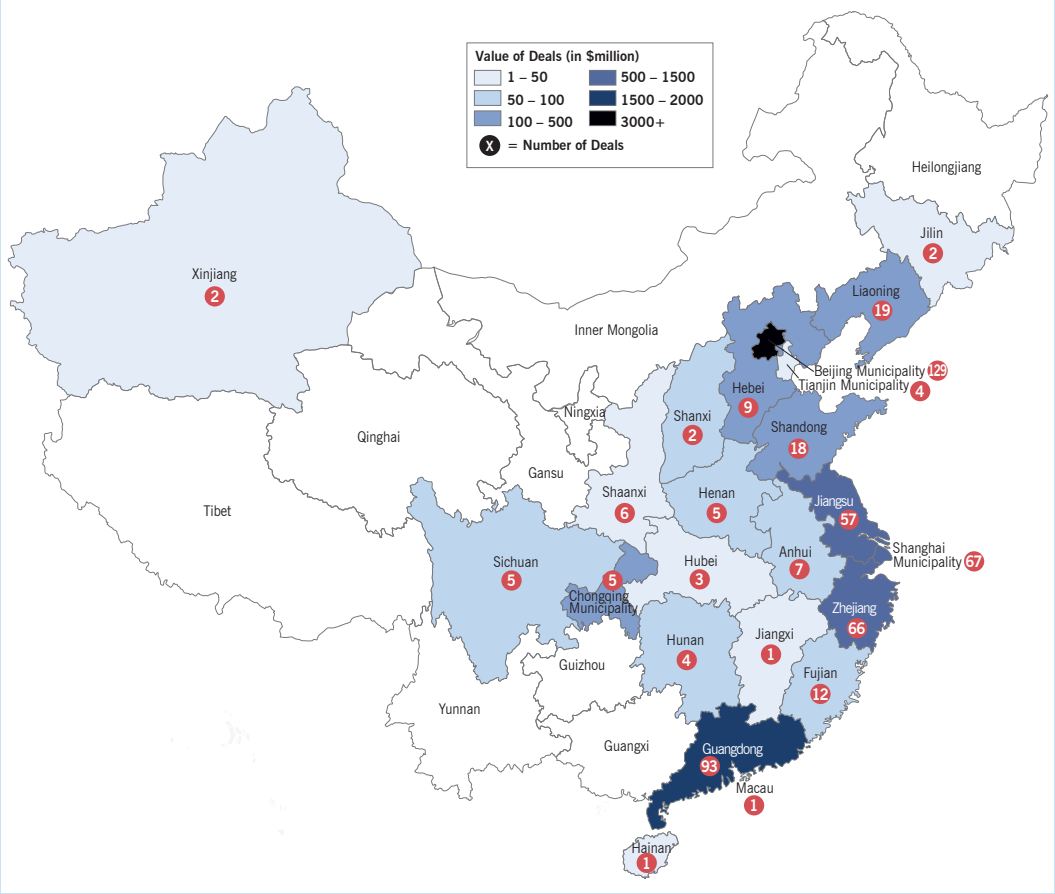


Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Not surprisingly, most Chinese firms investing in U.S. high-tech industries are headquartered in the most developed parts of China (Figure 11). A major source of high-tech OFDI is Beijing, which is home not only to many state-owned firms but also to most of China's major IT and software firms. Provinces with high per-capita income and a vibrant private sector, including Zhejiang, Guangdong, Shanghai, and Jiangsu, are other major sources of money flowing into U.S. high tech. Notable exceptions include provinces with low per-capita incomes but industry clusters that have an interest in U.S. investments, for example, renewable energy firms from Xinjiang. Another common characteristic of Chinese firms investing in U.S. high-tech sectors is that most of them already have overseas operations elsewhere, mainly in neighboring Asia or in Europe. In short, it is mostly private firms with global vision that are investing in U.S. high-tech sectors.

[19] Lenovo's acquisition of IBM's personal computer division is counted as a state-owned enterprise acquisition, as the state controlled more than 20% of the company in 2005. In the fall of 2009, the Chinese Academy of Sciences sold 29% of its stake in Lenovo to Fanhai Group for 2.8 billion yuan (US$434 million). Subsequently, Lenovo became a private enterprise under our definition.

Figure 11: Chinese FDI Transactions in High Tech by Headquarter Location of Investing Firm, 2000–2013



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

II. MOTIVATIONS: WHAT IS DRIVING CHINESE FDI IN U.S. HIGH TECH?

AFTER SKETCHING OUT THE GROWTH AND PATTERNS of Chinese FDI flows to U.S. high-tech industries, we now turn to a detailed analysis of the drivers of this trend. Understanding why Chinese firms are becoming interested in such investments overseas is critical for assessing the impacts of those investments on the U.S. economy and for discussing related policy questions. In this chapter, we analyze the motives for Chinese high-tech investments in the United States from a firm-level perspective. We find that the recent increase in Chinese high-tech OFDI in the United States was driven by a diverse set of motives that go well beyond the existing perception of merely "grabbing" foreign technology.

Many observers assume that the surge in China's outward FDI since the mid-2000s is attributable to a government campaign to promote overseas investment. China's outward FDI regime has indeed loosened up, especially since the government promulgated its "Going Out" campaign in 2000.[20] Analysts have combed through the patterns of outbound Chinese investment ever since, from early investments in natural resources to more recent acquisitions of advanced foreign technology, seeking a strategic rationale.[21] We recognize that political drivers are an important part of China's OFDI boom: the liberalization of the OFDI approval framework was a prerequisite for greater outflows; the government has enacted policies to support firms going abroad; and certain government policies are crucial in setting incentives (as well as disincentives) for firms to internationalize. However, we believe the recent growth in Chinese OFDI has been driven mostly by changing commercial realities in the Chinese marketplace, which are forcing firms to expand beyond China's borders.

Because of a lack of coherent theoretical frameworks for emerging-economy OFDI and the short track record of Chinese firms in overseas markets, most assessments of the drivers of Chinese OFDI have been limited to a qualitative discussion or to case studies of individual firms.[22] For our assessment, we take the novel approach of coding all of the 518 transactions in our high-tech sample using a taxonomy of firm-level FDI drivers. The taxonomy is derived from the work of John H. Dunning, who distinguished among four major motivations for firms' overseas investments: accessing natural resources, facilitating access to new markets, acquiring strategic assets to increase competitiveness, and improving the efficiency of their global operations. Dunning's work has been augmented and refined by others, but this basic taxonomy still provides a useful framework for

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[20] For an overview of China's outward FDI framework and its liberalization, see Rosen and Hanemann (2009).

[21] The allegation that Chinese firms are "syphoning" technology out of the United States through acquisitions has become a common theme; see "US Lawmakers Concerned by Huawei Deal," *Agence France-Presse*, February 10, 2011, accessed February 17, 2014, http://www.google.com/hostednews/afp/article/ALeqM5gfEkF3WfzaXI635GOEk8qrWD-eZw?docId=CNG.6b096ac0cdcfce7a0f599fbbb1c85c27.da1.

[22] For a comprehensive qualitative discussion of commercial and political drivers of Chinese outbound FDI in advanced economies, see Rosen and Hanemann (2009, 2011, forthcoming). For case studies, see, e.g., http://hbr.org/product/Wanxiang-Group—A-Chinese/an/308058-PDF-ENG or http://csis.org/files/publication/130215_competitiveness_Huawei_casestudy_Web.pdf, accessed February 17, 2014.

understanding what is driving Chinese firms to invest in U.S. high-tech sectors. In order to account for the increasing importance of passive quasi-portfolio stakes in global FDI, we added a fifth category of return-seeking FDI (see overview in Table 3).[23]

Table 3: Taxonomy of FDI Motives

Natural-Resources-Seeking FDI
Investments to gain access to particular resources that are not available or abundant at home or diversify supply of these resources.
Example: Suntech Power's acquisition of a stake in polysilicon supplier Hoku Scientific.
Market-Seeking FDI
Investments to facilitate access to overseas markets for goods or services.
Example: The establishment of operations by China Telecom Americas in New York or California to serve local customers.
Strategic-Asset-Seeking FDI
Investments to acquire or build strategically important assets that strengthen a firm's long-term competitiveness such as technology, brands, and distribution channels.
Example: Sanan Optoelectronics' acquisition of Luminus Devices, a firm with leading LED technology.
Efficiency-Seeking FDI
Investments that allows firms to reorganize their global operations to take advantage of different factor endowments, market structures, and institutional environments.
Example: The establishment of a Baidu artificial intelligence lab in California's Silicon Valley.
Return-Seeking FDI
Investments that are primarily made for financial returns but exceed the 10% threshold for FDI.
Example: Chengwei Capital's stake in Novasentis.

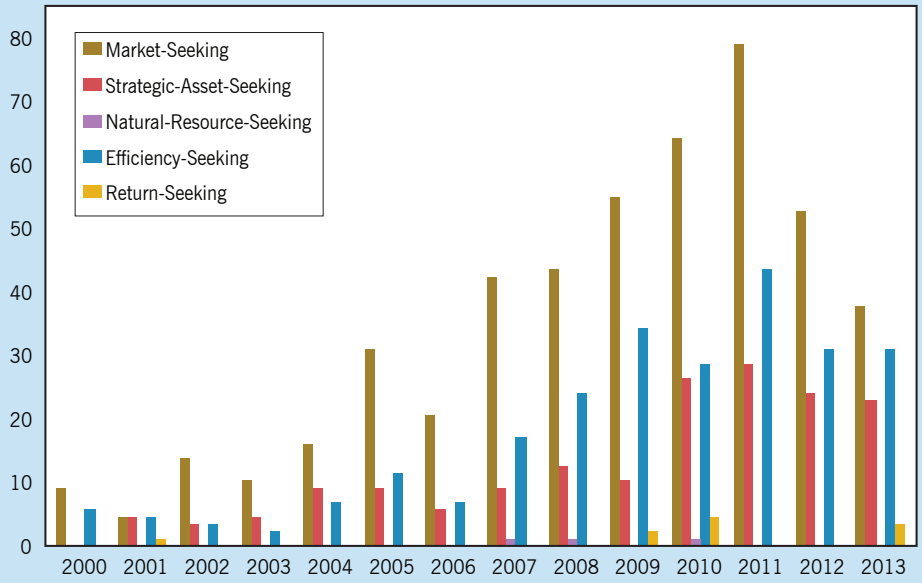
Source: Authors' compilation based on Dunning (1993). See Data Appendix for details on definitions and coding.

Coding each individual transaction gives us a snapshot of the firm-level drivers of Chinese investment in U.S. high-tech industries from 2000 to 2013 (Figure 12). The coding was based on company information and our professional judgment and does not include an assessment of potential noncommercial motivations. The five categories are not exclusive, meaning that one FDI transaction can be motivated by a mix of these factors.[24]

We find that the major motivation for Chinese firms to invest in U.S. high-tech industries is to *seek markets*, that is, to increase their local market share or find new markets for products and services. A total of 419 transactions, or 81%, have a market-seeking component to them. This is very similar to overall Chinese investment into the United States, starting from trade-facilitating investments such as sales offices to more sophisticated operations, recently including the provision of after-sales services.

[23] For a detailed description of taxonomy, definitions, and coding, see Data Appendix.
[24] For more details on coding, see the Data Appendix.

Figure 12: Chinese FDI in U.S. High-Tech Industries by Motivation, 2000–2013
Number of deals



Source: Rhodium Group. The five categories are not exclusive, and therefore single deals were often coded for a mix of motives. For more information on coding, see the Data Appendix. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

A second important driver of overall Chinese investment in the United States, *access to natural resources*, is not a major driver in high-tech industries. Chinese firms invested more than $10 billion in U.S. oil and gas assets alone from 2000 to 2013 with the goal of diversifying their global upstream assets and gaining exposure to new extraction processes. However, there are only a handful of deals in our sample of 15 innovation-intensive industries motivated by securing input materials, for example, Suntech's 2008 acquisition of a minority stake in upstream supplier Hoku Scientific to secure high-quality and low-cost polysilicon and silicon wafers.

A third major driver of overall Chinese FDI in the United States is investments that aim at *long-term financial return*. Usually, such transactions would be counted as portfolio investment, but in some cases, the equity stake exceeds 10%, which puts them in the FDI category. Examples are stakes by China's sovereign wealth fund in U.S. utility companies (AES and Intergen) and the recent increase in purchases of commercial real estate in the United States by Chinese institutional investors or conglomerates. Given the well-developed venture capital sector, such passive stakes for financial returns are an important feature of many U.S. high-tech industries, but they are not yet a significant driver of Chinese activity. While we identify an increase in Chinese interest in venture capital investments in U.S. high-tech firms, these stakes only rarely surpass the 10% threshold for FDI. One example is Alibaba's stake in U.S. e-commerce firm ShopRunner.

The most notable trend for Chinese FDI in U.S. high-tech industries (also visible in the overall U.S. picture) is the increasing importance of two new drivers: *the acquisition of strategic assets* to enhance firms' long-term competitiveness (e.g., technology, distribution channels, and brands) and investments to achieve *greater efficiency of global operations* by taking advantage of different factor endowments, market structures, and institutional environments. The share of transactions with a strategic-asset-seeking or efficiency-seeking component increased from 28% in 2003 to an average of 45% in 2009–2013.

In short, Chinese firms invest in U.S. high-tech sectors mostly because they want better access to the U.S. market for their products and services. However, the acquisition of technology and know-how and the utilization of local U.S. advantages such as human talent and the regulatory system have become important drivers in recent years. We look into each of these motivations in detail next.

ACCESS TO THE U.S. MARKET

Improving access to the U.S. market for Chinese goods was the dominant motive for Chinese FDI in the past decade, and it is also the most important driver of investment in the 15 innovation-intensive industries: 419 of 518 high-tech deals have some kind of market-seeking motive. Market seeking is an important driver across all 15 industries; transactions with a market-seeking component are often greenfield projects (83%), dominated by private investors (76%), and relatively small in size (average size of $15.1 million and median of $2 million) (Figure 13).

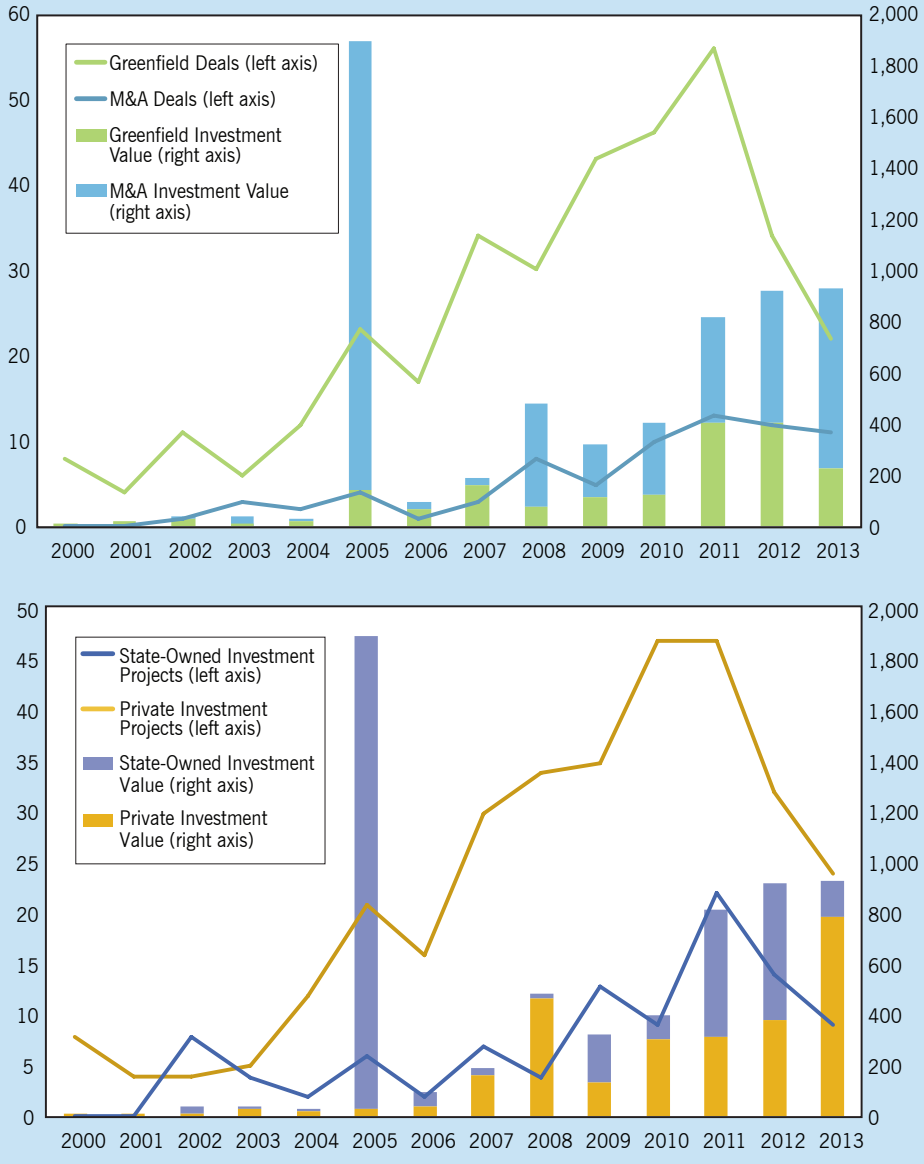
The majority of market-seeking deals still come in the form of small-scale operations to facilitate exports of Chinese-made goods, such as rep offices and distribution channels. Most of these products are labor intensive but relatively low tech, such as consumer electronics and auto parts. Examples are regional sales offices of Huawei in Texas and other locations; sales operations by Guansheng Auto Parts in South Carolina; and offices of solar manufacturers Trina and Yingli in California.

In recent years, as the Chinese economy has matured, we have seen market-seeking investments evolving beyond just trade offices. Investing in larger-scale service operations is necessary to enter new product segments that require greater local presence, and it allows firms to overcome their focus on the low-margin manufacturing process and capture margins in other parts of the value chain. These investments still largely take the form of organic expansion through new greenfield operations. Examples are Huawei's investments in customer operations for its smartphones and other devices in Texas, California, Kansas, New Jersey, Washington, Georgia, and Illinois; Sany's new facilities in Georgia to help sell construction equipment and heavy machinery; and the operations of Haier America in South Carolina and Hisense USA in Georgia.

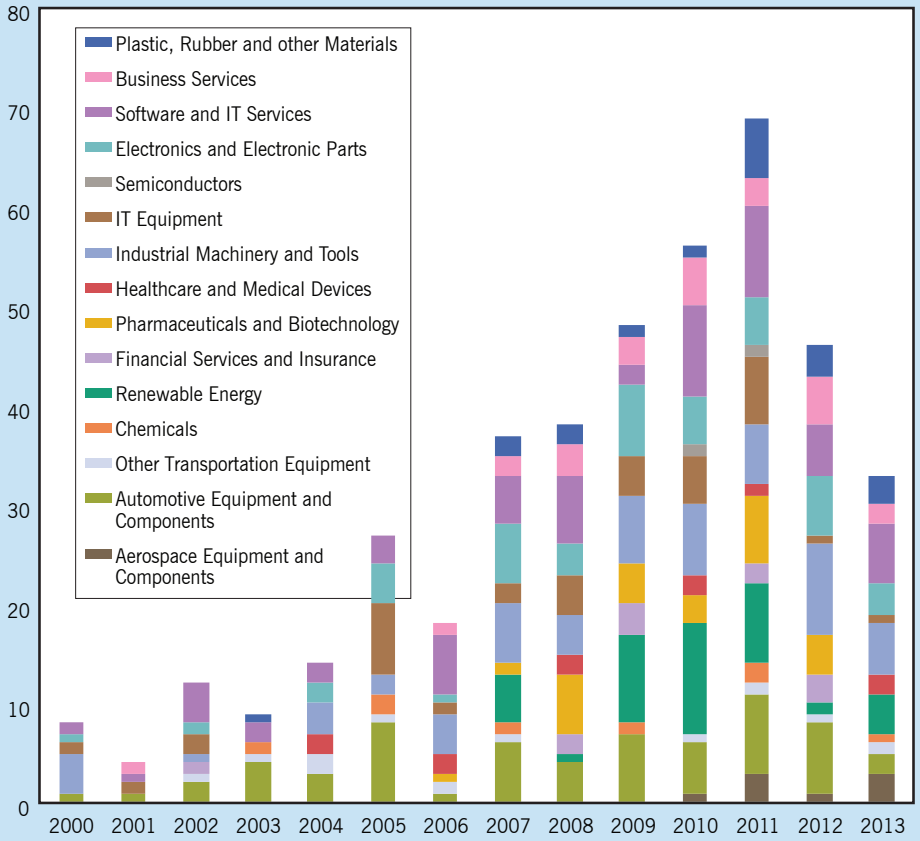
A second trend within market-seeking investments is that Chinese firms have begun to invest in local manufacturing as they recognize the advantages of localized production. Some firms see advantages in being closer to their U.S. customers, for example, auto supplier Nexteer in Saginaw, Michigan; Jinko Solar in California; and Lenovo in North Carolina. Others build local manufacturing

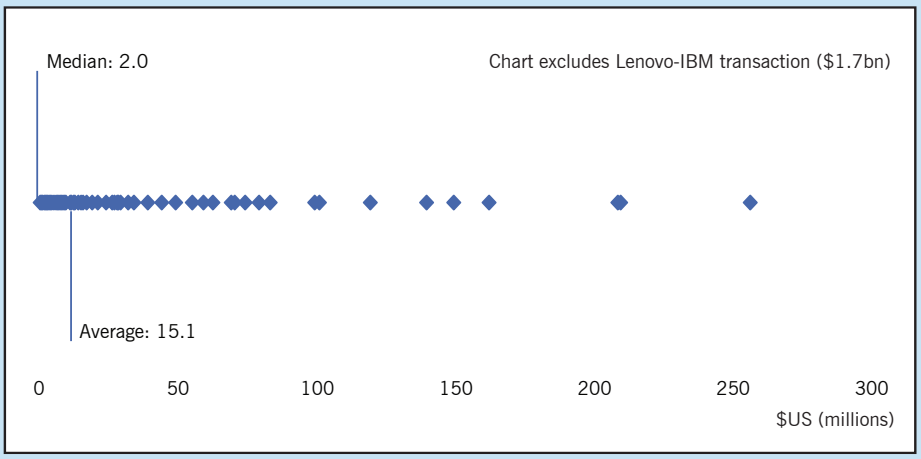
operations because they bet on the "Made in the USA" branding: for example, Haier and Top Eastern Group in South Carolina. In some states, firms have incentives to build local assembly lines as a result of existing "buy local" rules and other political dynamics. Examples are the operations of electric vehicle manufacturer BYD in Los Angeles, which is hoping to sell its buses for public use, and the assembly lines of Suntech in Arizona.[25]

Figure 13: Market-Seeking FDI in U.S. High-Tech Industries, 2000–2013



[25] The Suntech facility was closed in 2013 after Suntech went into bankruptcy.





Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

Third, while market-seeking investments have been dominated by manufacturing firms, we see a clear increase in Chinese services firms trying to expand into the U.S. market. In the past, service firm investments were mostly limited to trade-related services such as shipping or air transport. Now, Chinese providers of high-value-added services are following their Chinese customers abroad and positioning themselves in the U.S. market for future growth. Examples are financial service firms, including Industrial and Commercial Bank of China and China International Capital Corporation; communications providers such as China Telecom and China Unicom; law firms such as Jun He, Yingke, and Dacheng; and software and IT service providers, including Alibaba, HiSoft, and Tencent.

ACQUISITION OF STRATEGIC ASSETS

Acquiring strategic assets that increase a firm's global competitiveness has emerged as another important driver of Chinese FDI in the 15 industries that we identified as innovation intensive. From 2000 to 2012, 149 of 518 high-tech deals were partially or wholly driven by gaining access to assets such as technology, brands, and distribution channels. By definition, strategic-asset-seeking investments are almost exclusively acquisitions. They are significantly larger on average than market-seeking investments, with an average value of $54.1 million and a median of $13.1 million (Figure 14).

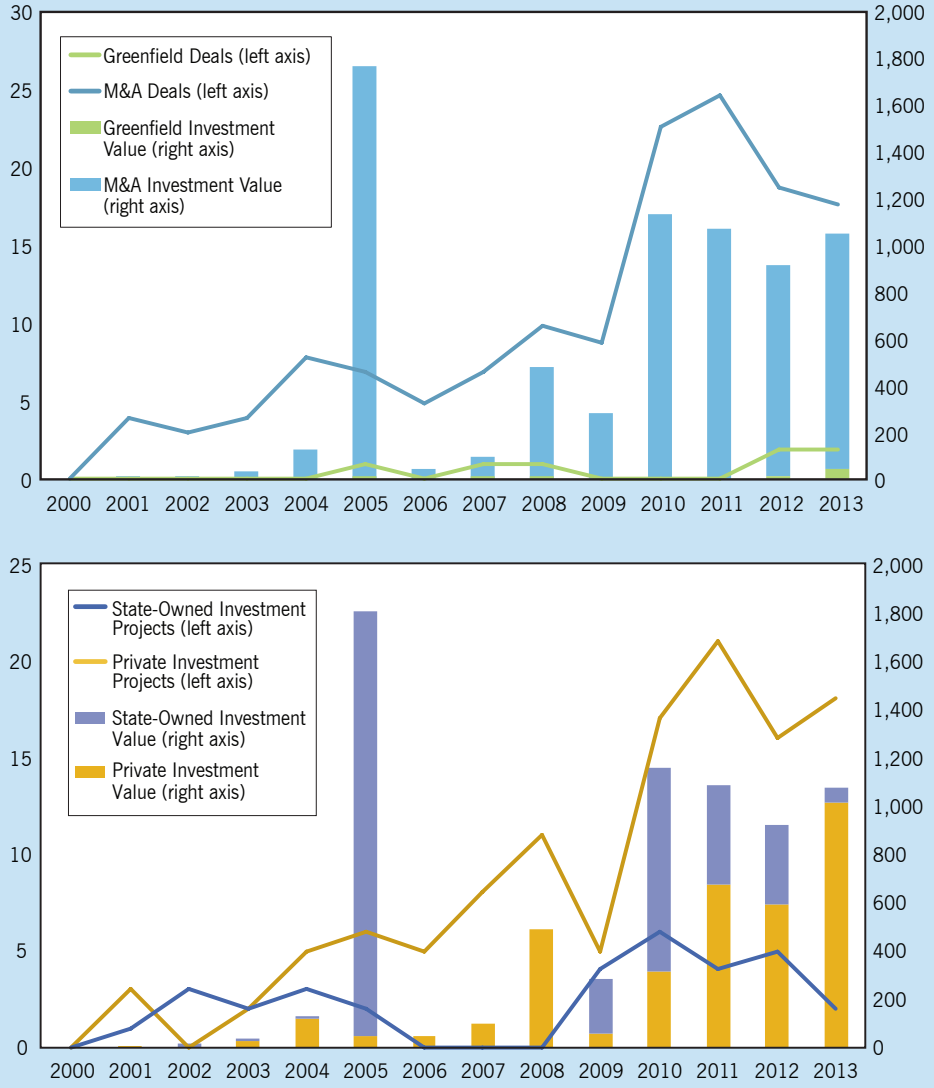
With regard to the type of strategic assets in U.S. high-tech sectors, most Chinese investors target distribution channels and technology. Brands are becoming more important in the overall U.S.–China FDI relationship (e.g., Smithfield), but they still play a comparatively small role in technology sectors, with the exception of the Lenovo-IBM transaction in 2005. The Lenovo-Motorola acquisition and other transactions announced in the first months of 2014 indicate that brands will become more relevant in coming years.

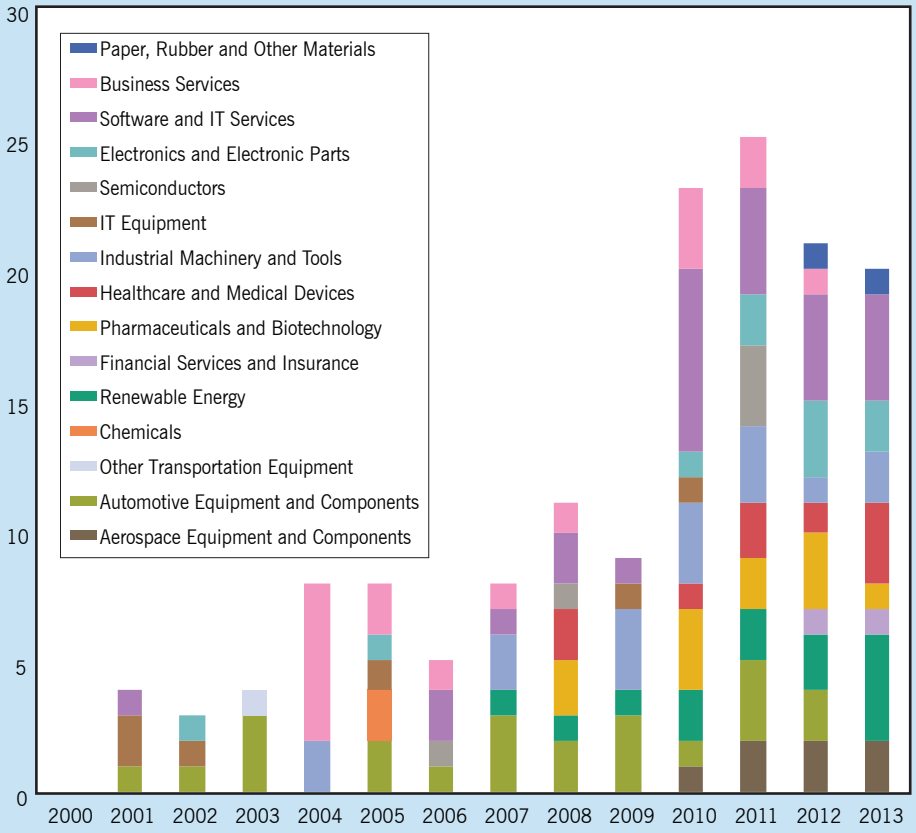
Access to established distribution channels, customer relations, and market know-how are particularly important in industries in which Chinese firms are highly competitive in manufacturing but lack downstream capabilities and consumer brand value, such as consumer electronics or software and IT equipment. Examples are Lenovo's acquisition of IBM's PC division for its brand and distribution channels and the recently announced takeover of bankrupt electric vehicle maker Fisker by China's Wanxiang for its design and brand recognition.

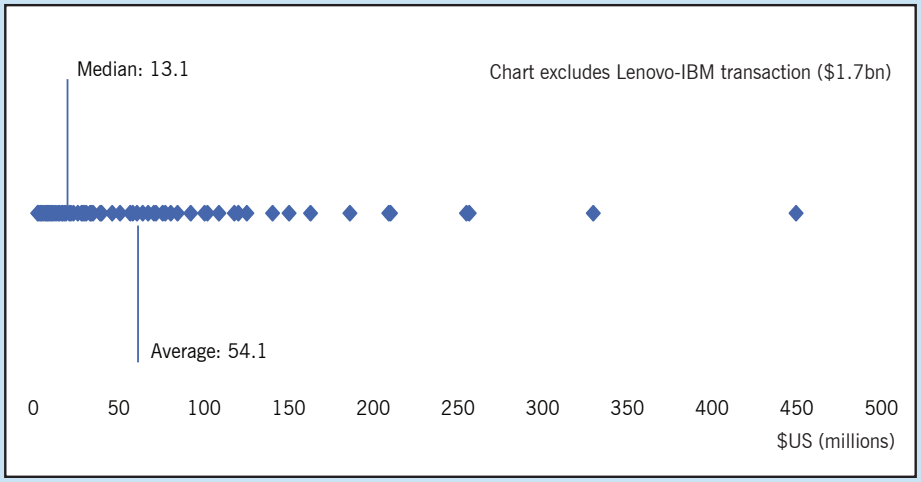
In addition to distribution channels and customer relationships, Chinese firms are increasingly looking for knowledge, experience, and products that complement their strengths in low-value-added manufacturing and that allow them to move to the next stage of their development. One common pattern is that human talent and related knowledge and experience play a key role, reflecting a lack of such assets in China. Often, strategic-asset-seeking acquisitions serve as a starting point for greater "efficiency-seeking" FDI in the form of greenfield investments in R&D or design capabilities outside China (see the next section). More tangible technology assets such as patent portfolios are not yet a major driver of high-tech acquisitions, but recently announced transactions such as the Lenovo-Motorola acquisition indicate that such assets will become more important in the future, as Chinese firms expand beyond China's borders.

We also find an evolution of industries in which these strategic asset investments happen. In the early 2000s, it was mostly automotive parts and IT equipment manufacturers that were seeking to invest in strategic U.S. assets—for example, Wanxiang Group's acquisitions of Universal Automotive Industries in 2001 and Rockford Powertrain in 2003; Lenovo's purchase of IBM's PC unit in 2005; and Huawei's failed takeover of 3Com in 2008. Since the mid-2000s, the mix of manufacturing firms acquiring strategic assets in the United States has become more diverse, with transactions in new energy (Hanergy's acquisition of MiaSolé in 2012), aerospace (China Aviation Industry General Aircraft's acquisition of Cirrus in 2011), medical devices (Mindray's acquisition of ZONARE), and

Figure 14: Strategic Asset-Seeking FDI in U.S. High-Tech Industries, 2000–2013







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pharmaceuticals (WuXi PharmaTech's acquisition of AppTec in 2008). In recent years, we also recorded a greater number of Chinese service firms looking to acquire competitiveness-enhancing assets in the United States, including information technology, finance, and business services. Examples are Alibaba's purchase of Vendio and Auctiva in 2010, Tencent's acquisition of Riot Games, and Industrial and Commercial Bank of China's acquisition of Bank of East Asia's U.S. operations in 2012.

IMPROVING THE EFFICIENCY OF GLOBAL OPERATIONS

In addition to the acquisition of strategic assets, a second newly emerged driver of Chinese FDI in U.S. high-tech industries is the desire of Chinese firms to increase the efficiency of their global operations. We record 219 transactions that partially or wholly aim at improving firms' operational efficiency. The annual number of transactions increased from an average of 5 in 2000–2007 to 28 in 2008–2013. Almost all of these investments are greenfield projects (93% of deals, 78% of value). Similar to market-seeking investments, they are typically small in size, with an average of $8.7 million and a median of $2.0 million from 2000 to 2013 (Figure 15).

Greater efficiency-seeking FDI is a result of more global thinking by Chinese firms when it comes to their value chains. After three decades of building up economies of scale at home in mostly low-end manufacturing, firms now face pressure to change their business models, and they increasingly have the freedom to rationalize their operations according to global market logic.

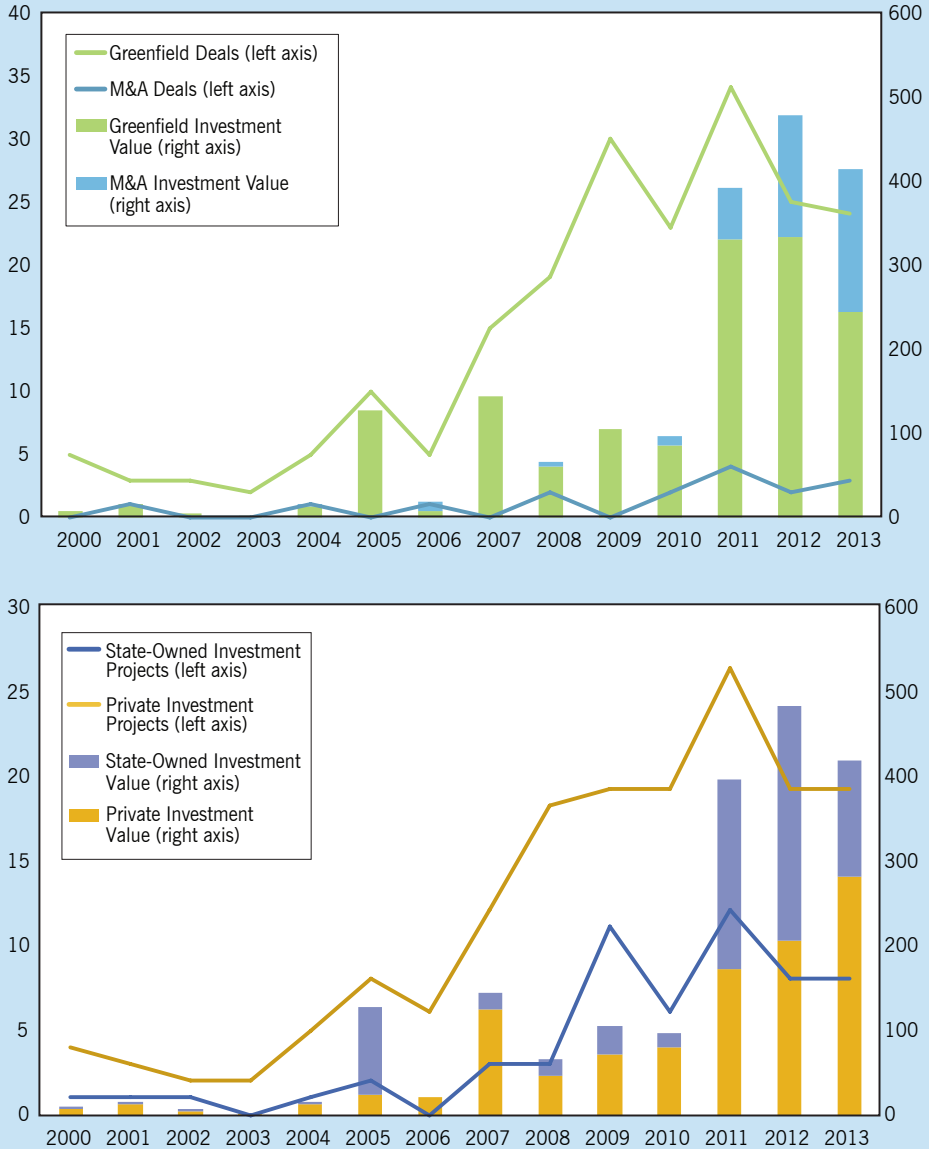
One of the major shortcomings they face in China is the lack of talented and experienced staff.[26] Expanding their presence in the United States allows them to tap into a creative, experienced, highly educated, and diverse workforce. Investments by Chinese firms in U.S. R&D, design, and other operations requiring qualified staff have increased substantially in recent years. Prominent examples are Huawei's local operations in Silicon Valley, Tempo International Group's R&D center in Michigan, China International Capital Corporation's office in New York, and Baidu's artificial intelligence lab in California. Most of these investments are greenfield investments or expansions of existing facilities after the takeover of a U.S. firm in the form of expansion or additional hiring. Examples of post-acquisition expansion are Lenovo's operations in North Carolina, Nexteer's facilities in Michigan, and Cirrus Aviation in Minnesota.

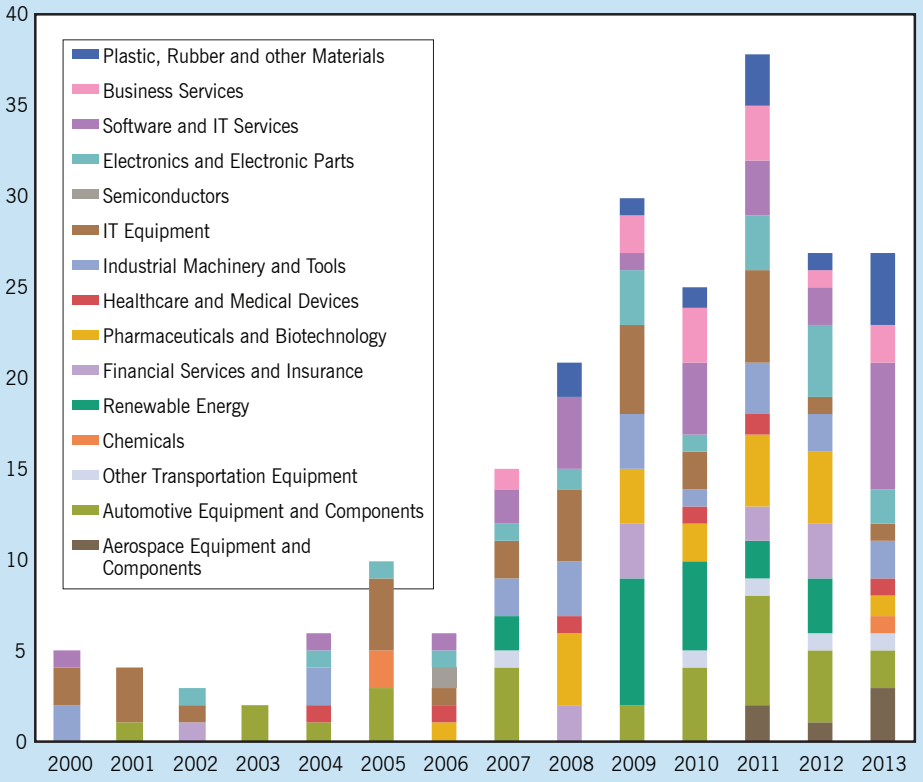
The institutional gap between China and the rest of the world is another important driver of efficiency-seeking investments. For one, investments in the United States give Chinese firms exposure to a modern regulatory environment and help them prepare for China's convergence with such frameworks in the future. The growing expansion of Chinese banks and insurance firms is partially driven by this learning motive. Second, the sound U.S. legal system in general and the strong protection of intellectual property rights (IPR) provides an incentive for Chinese firms to invest in U.S. R&D operations if they possess or develop cutting-edge technologies that could be at risk in China's subpar IPR regime. Third, many Chinese high-tech firms establish operations in

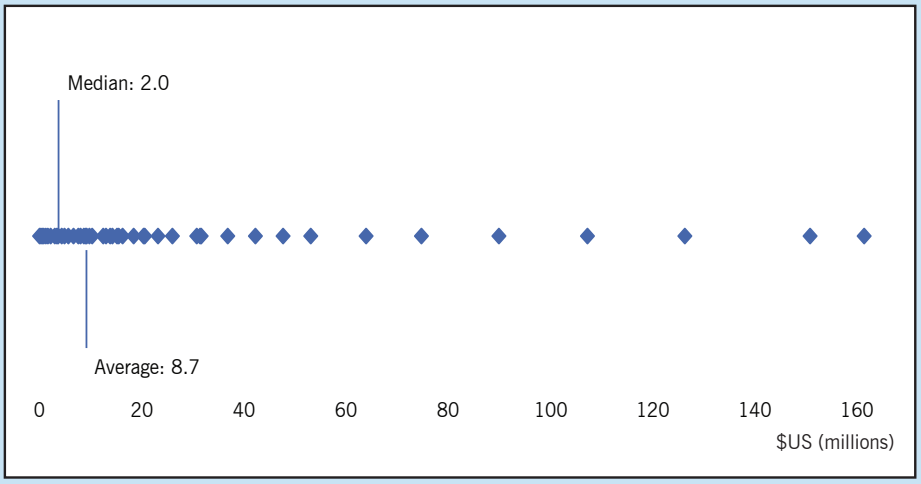
[26] For an academic perspective on China's human resources for science and technology problem, see OECD (2008c) and Wang (2012); for a business perspective on the talent shortage, see McKinsey Global Institute, "Addressing China's Looming Talent Shortage," October 2005, accessed February 17, 2014, http://www.mckinsey.com/insights/china/addressing_chinas_looming_talent_shortage.

the United States to have better access to U.S. capital markets. Some of China's biggest technology firms, among them Baidu, Netease, and Sohu, are listed in the United States because Chinese capital markets did not allow them the flexibility and depth to raise funds at an early development stage. These listings incentivized some initial U.S. presence that paved the way for bigger operations at a later stage. In short, the United States' sound legal environment and deep financial markets make it an interesting choice for private Chinese firms that aim to expand globally but face capital controls and other administrative hurdles in China.

Figure 15: Efficiency-Seeking FDI in U.S. High-Tech Industries, 2000–2013







Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

III. IMPACTS: SHOULD WE WELCOME CHINESE FDI IN TECH?

WE HAVE DESCRIBED THE GROWTH AND DRIVERS of increasing Chinese high-tech investment, but what American workers, consumers, and politicians are most concerned about is the impact of these investments on employment, innovation, and long-term competitiveness. In this chapter, we review the debate about the risks and opportunities of foreign investment, highlight concerns related to high-tech FDI from China, and review existing evidence and data to assess the validity of those concerns. We find that FDI from China can yield tremendous tangible benefits such as greater local innovative capacity and job creation. Greater levels of bilateral investment in high tech will also help foster China's integration into a market-based approach to global innovation, as opposed to the scenario of techno-nationalism. At the same time, existing concerns about the impact of Chinese FDI on national security and potential economic distortions are heightened in the case of high-tech investments.

Foreign direct investment is generally understood to be a net positive for recipient countries.[27] For consumers, foreign investment intensifies the contest for buyers' attention, leading to more choices, lower prices, and innovation. For firms, FDI opens new markets, increases operating efficiency across borders, and reduces production costs, thereby increasing economies of scale and promoting specialization. It also means better prices for firms looking to divest assets, thanks to a bigger and more competitive pool of bidders. In local communities, foreign investment brings and/or sustains jobs, tax revenue, and knowledge spillovers from worker training, technology transfers, and R&D activities. For these reasons, most countries not only keep their doors open to FDI but actively promote the inflow of foreign capital.

At the same time, there are potential negative economic and political impacts from FDI: overdependence on certain industries, threats to competitive markets, and foreign control over assets and technologies that are considered important for national security. Therefore, most countries have policies in place to safeguard against distortions of healthy market structures and to screen for national security threats. Frameworks to screen for national security threats and merger control regimes are internationally accepted as features of open investment regimes.[28]

The recent takeoff in FDI from China has spurred debate in many countries about whether these considerations apply in the same way to the case of Chinese capital and whether recipient countries need new policies to adapt to these new flows.[29] A range of special political and economic characteristics prompt this anxiety: China's economic size, which will make it a systemically important

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[27] For a detailed treatment of benefit from FDI, see OECD (2002).
[28] For national security practices, see Yannaca-Small (2007); for global merger control and competition policy, see Gerber (2010).
[29] For an overview of these debates in the United States, see Rosen and Hanemann (2011); for an assessment of Europe's reactions to Chinese investment, see Hanemann and Rosen (2012).

country with enormous leverage and potential for setting standards and influencing global asset prices; the nonmarket features of China's developmental model, such as state ownership, industrial policy, and restrictions on foreign investment; and its authoritarian political system and foreign policy strategy. With regard to Chinese investment in high-tech industries, three concerns stick out: (1) a combination of China's economic size and unfair competitive advantages could crowd out other firms and threaten competitive markets in the longer term; (2) existing industrial policy and state control could incentivize Chinese firms to move innovation-intensive activities back to China, against commercial logic; and (3) Chinese investment could threaten U.S. national security through control over critical defense inputs or exporting dual-use technology to hostile regimes.

PRODUCTIVE COMPETITION OR THREAT TO COMPETITIVE MARKETS?

As shown in the previous chapter, one major motivation for Chinese firms to invest in U.S. high-tech sectors is to expand their market share in the United States. As a major vehicle for multinational firms to expand their presence in overseas markets, FDI will enable Chinese firms to further expand their U.S. market share. For example, it will help them compete in product markets that require local service operations, such as machinery or cars. Acquiring U.S. firms with existing clients and products will also allow them to enter new markets quicker than before, such as general aviation. The question for American firms and consumers is whether this new competition borne of greater Chinese market share—and, potentially, market power—is good for them and what distributional consequences it will have.

In economic theory, one of the major benefits from FDI is that it fosters market competition, which is good for consumers and producers alike. For consumers, the results of increased competition are usually lower prices and better value, as well as greater choice. China's integration into global value chains as a goods exporter has already yielded significant benefits to U.S. consumers, and greater Chinese investment in the United States creates an opportunity to extend these gains to other product segments that require a more active presence in consumer markets and, especially, to services. The examples of other Asian economies illustrate these benefits—think of Samsung's role as a competitor to Apple's smartphone dominance or the importance of Japanese and Korean carmakers in the U.S. market.

Today, relatively few Chinese companies have made the step to consumer brands, particularly in technologically advanced products. However, despite its low development stage, there already are examples of firms positively influencing American consumer choices and prices. For instance, the market entrance of Haier fostered greater competition in U.S. white goods markets, bringing American consumers lower prices and more innovative products. Or take Lenovo, which has become the world's second-largest PC maker and is today an important supplier of laptops to U.S. consumers. These examples, of course, are comparatively mature-tech products, but firms with highly innovative products are already knocking at the door, for example, Alibaba, with its innovative approach to business-to-business online commerce; Tencent, with its popular WeChat application; and consumer electronics firms such as Huawei, Xiaomi, and Coolpad, with their affordable smartphones.

For producers, new competition resulting from FDI is also a good thing, as it forces firms to innovate and allows them to adjust their business models and maximize shareholder value by divesting unprofitable segments.[30] New market entrants and competition from abroad have been key drivers of U.S. technological progress. Competition from China in the past has accelerated this kind of structural adjustment mostly through the trade channel, by moving lower-value-added parts of the value chain overseas. Looking forward, the inward FDI channel will become another important conduit for structural change, as many Chinese firms look to upgrade their technology and brands, which offers U.S. firms the opportunity to maximize the value of existing assets. The divesture of IBM's PC unit to Lenovo and the pending sale of business servers manufacturing between the same pair illustrate this logic. After pioneering the development of personal computers, IBM's PC unit performed poorly as the technology matured. By shedding an unpromising area of its business, IBM was able to focus on more promising and profitable business lines such as servers and IT services. For Lenovo, this transaction was generally a win, too, as it allowed the firm to move from an unknown Chinese supplier to one of the world's most well-known household and business brands.

While openness to FDI and trade are important drivers of competition in an open economy, these flows can harm domestic market structures if imports crowd out domestic firms through unfair practices or if foreign takeovers increase market concentration to an unhealthy degree.[31] For high-tech sectors, such negative external shocks are considered particularly threatening, as the entry barriers to markets are relatively high.[32] That is why most open economies attempt to safeguard against such negative effects with mechanisms such as countervailing duties on subsidized goods and competition policies to avoid overconcentration of markets.[33]

China's nonmarket economic policies pose particular thorny questions with respect to impacts on foreign markets. In the past, these concerns mostly surfaced as trade frictions between China and its trading partners. China has become the number-one target of World Trade Organization cases focusing on subsidies and dumping.[34] With regard to FDI from China, two concerns are most prominent: First, firms are concerned about unfair advantages for their new Chinese competitors when competing on their home turf. These concerns arise from existing nonmarket elements in the Chinese economy such as state ownership, subsidies, discriminatory industrial policies, and asymmetries in formal investment openness between China and the rest of the world (Figure 16). Second, from the perspective of aggregate economic welfare, such unfair competition could crowd out commercially efficient local firms in the long run, which would be detrimental to consumer welfare, innovation, and long-term competitiveness of the host economy.[35]

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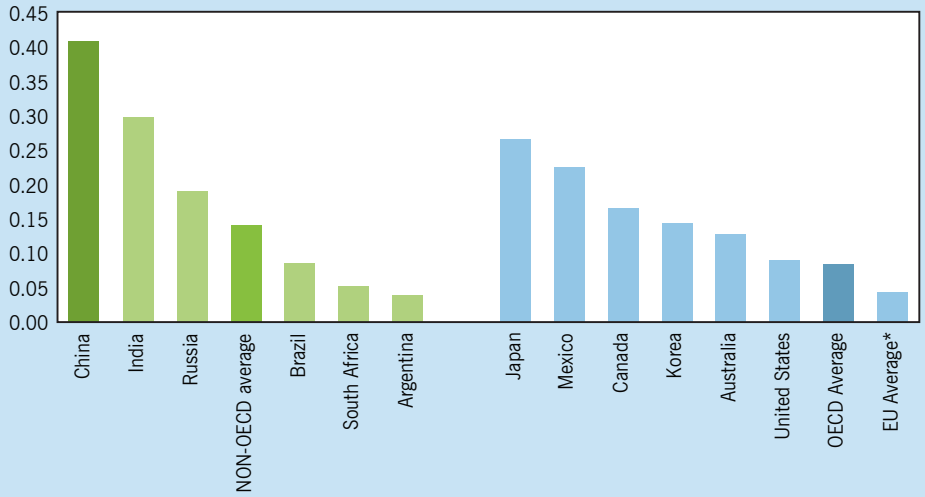
[30] See Aghion et al. (2006).
[31] The idea that monopolistic market structures cause economic inefficiencies goes back to Chamberlin (1933) and Robinson (1933). For background on U.S. competition policy, see Fox and Pitofsky (1997).
[32] See the concept of "dynamic efficiency" in Motta (2004).
[33] For background on global competition policy, see Graham and Richardson (1997) and Gerber (2010).
[34] World Trade Organization's number of antidumping disputes by exporting country, December 2012, accessed February 17, 2014, http://www.wto.org/english/tratop_e/adp_e/AD_InitiationsByExpCty.pdf; and WTO number of countervailing disputes by exporting country, December 2012, accessed February 17, 2014, http://www.wto.org/english/tratop_e/scm_e/CV_InitiationsByExpCty.pdf.
[35] For a detailed assessment, see Rosen and Hanemann (forthcoming).

Figure 16: Formal FDI Restrictiveness, 2012

0 means completely unrestricted market access; 1 means completely restricted.



Source: OECD, Rhodium Group. Calculated based on available OECD data for 24 of 27 European Union member countries.

Aggregate welfare concerns are not an immediate threat but a longer-term consideration. There are few, if any, examples of high-tech industries in which Chinese firms already have a substantial market share and are substantially ramping up overseas investments at the same time. One industry that provides a useful case study to monitor such concerns is solar photovoltaic, where Chinese firms dominate global production at the low end, largely because of government subsidies and other artificial cost advantages such as low-cost financing, and are now acquiring U.S. and other foreign solar firms with advanced technology.[36] However, the industry was a foster child of subsidies in the first place and is now in the midst of a global consolidation process with uncertain outcomes, so it is too early to draw conclusions. In general, most product markets currently dominated by Chinese suppliers are relatively low-tech goods with fierce competition inside China. In the case of advanced products, most of the high-tech components are still imported from elsewhere in Asia. Once Chinese firms reach a potentially dangerous market share, U.S. competition authorities have effective instruments for both controlling inbound acquisitions and policing post-market-entry behavior.

From an individual firm perspective, however, concerns about unfair competition are more immediate. The nonmarket elements of China's economy have become a real concern for many companies competing head to head with Chinese firms globally. In the high-tech space in particular,

[36] For an assessment of the cost advantages for Chinese solar photovoltaic manufacturers, see Goodrich et al. (2013). Chinese acquisitions in the U.S. solar industry grew from $27 million in 2008 to $122 million in 2012. The most prominent examples are Hanergy Holding Group's acquisition of MiaSolé and Global Solar Energy Inc.; Zongyi Solar's acquisition of Clean Jersey Solar; and LDK Solar's acquisition of Solar Power, Inc.

Beijing and the provinces are pursuing an extraordinary range of policies to help China catch up in innovation. These formal and informal policies may give some favored firms advantages that allow them to outcompete otherwise more competitive firms at home and abroad. Perhaps the best illustration of the validity of foreign concerns about unfair advantages by state-owned and state-supported enterprises is the ferocious debate inside China over the threat to the nation's nascent private sector posed by these firms and the aggressive reform agenda announced in 2013 that promises to eliminate many such distortions in favor of a greater role for market forces.[37] The behavior of China's state enterprises may be even harder to discipline abroad than it is at home, since they are out of Beijing's regulatory and inspection grip once offshore.

GREATER INNOVATIVE CAPACITY OR TECHNOLOGY TRANSFER?

Our data show that upgrading technology and operational efficiency is a second major driver of Chinese FDI in the United States. This leads to another important question: does foreign investment increase U.S. innovative capacity or accelerate the leak of U.S. technology overseas to the detriment of long-term innovative capacity and related jobs?

The logic of globalization is that countries specialize in whatever they can do best in global comparison.[38] For decades, the United States has been one of the most—if not *the* most—attractive place for innovation-intensive activities in global value chains.[39] Commonly cited reasons for this are abundant human talent, access to the world's largest market, a unique financial system adept at funding innovation, and a supportive legal system with strong patent and IPR protection.[40] Foreign firms have become an important source of investment in U.S. innovative capacity, and most major firms with global operates have R&D activities in the United States. Today, affiliates of foreign enterprises spend more than $40 billion on R&D in the United States annually—around 14% of total U.S. R&D expenditure (Figure 17).

With a maturing economy and greater freedom for its firms to invest overseas, China presents the United States with a unique opportunity to leverage its comparative advantages and strengthen its innovative capacity. For the past 20 years, FDI was a one-way street from the United States to China, accelerating the offshoring of labor-intensive manufacturing and the transformation of the U.S. economy toward services. The next phase of China's growth will foster new economic activities that flow the other way as well. Structural change is forcing Chinese firms to adjust their business models, and greater freedom to invest overseas for the first time allows them to rationalize value chains across borders instead of merely ramping up economies of scale in local manufacturing. We project that China's OFDI stock will grow from currently $500 billion to $1 trillion to $2 trillion by 2020, and a significant share of this will build global capabilities in innovation and technology.

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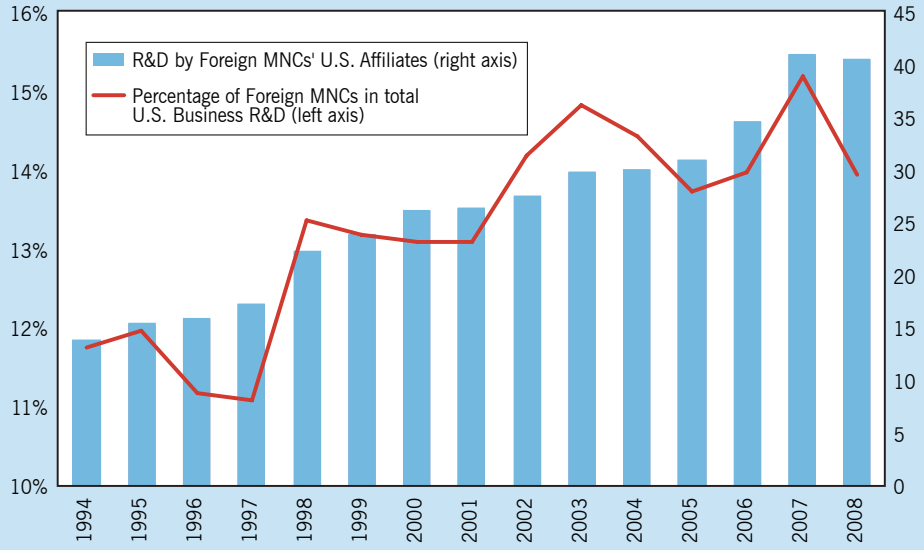
[37] See the "Central Committee of the Communist Party of China Decisions Regarding Key Questions On Fully Deepening Reform" report published during the Third Plenary Session of the 18th Central Committee, accessed March 3, 2014, http://news.xinhuanet.com/politics/2013-11/15/c_118164235.htm.

[38] The idea of comparative advantage and international trade goes back to the work of David Ricardo (1817).

[39] For a historical perspective on foreign investment in U.S. technology, see Wilkins (1989, 2004).

[40] OECD (2012).

Figure 17: R&D Spending by Foreign Affiliates in the United States, 1994–2008
Total spending in $US (billions), share (%) of total U.S. corporate R&D spending



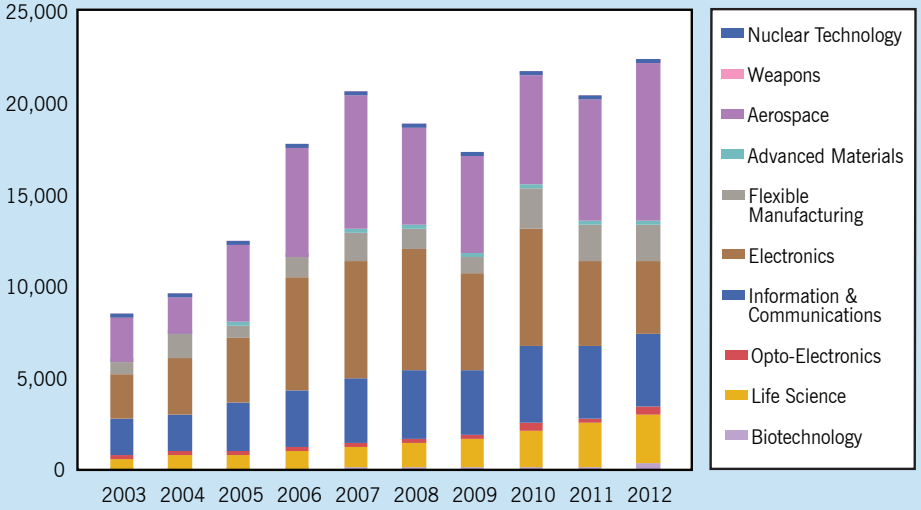
Source: Authors' compilation based on data from the National Science Foundation.

The United States is well positioned to be a recipient of these flows, as it offers what the next generation of Chinese investors is looking for: strong brands, world-class technology, a highly skilled workforce, a legal environment supportive of innovation, and modern corporate governance and management structures. As an innovation hub for Chinese firms, the United States would benefit from greater local R&D capacity and high-skill job creation. Investments would likely yield positive spillover effects for local economies through worker training and the introduction of new technologies and production techniques as Chinese firms move closer to technology leadership. Greater Chinese presence, in combination with rationalized export control rules, could also boost U.S. high-tech exports to China (Figure 18), contributing to more balanced trade patterns.[41] Growing Chinese FDI in the United States could also help boost royalty and license fee payments from China to the United States through intra-company payments and accelerate China's convergence with global norms of IPR protection (Figure 19).

The example of Japanese and Korean firms illustrates the opportunities brought by structural adjustment combined with an opening up to outward FDI. When these economies matured, structural reforms at home and greater freedom to invest overseas led to a wave of outward FDI, partly aimed at upgrading technology and expanding R&D capacities globally. When Japanese firms arrived in the United States, they were dismissed as primitive. Today, they are at the forefront

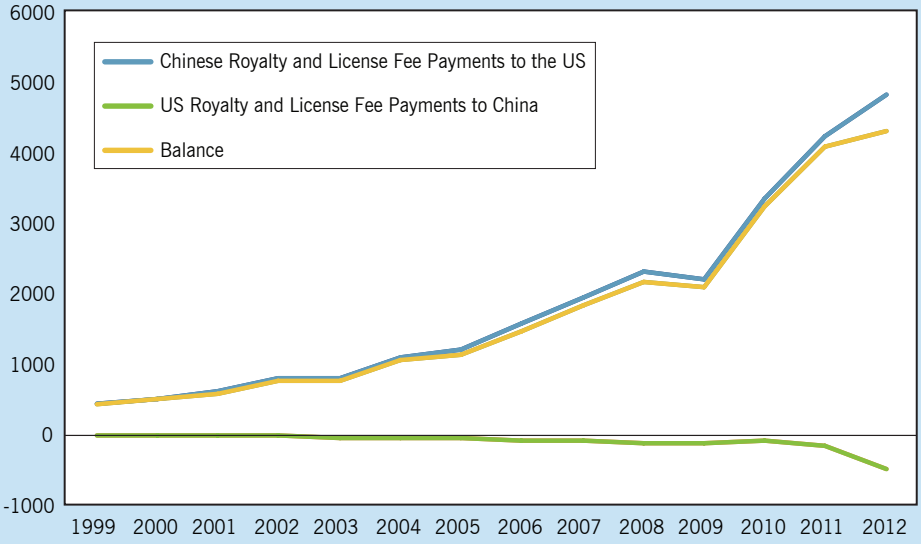
[41] High-tech exports to China have doubled in the past decade, but the overall trade balance remains imbalanced. In 2012, the United States exported high-tech goods worth $22 billion to China while importing $141 billion, with the majority of the deficit in electronics and IT equipment.

Figure 18: U.S. High-Tech Exports to China by Product Category, 2003–2012
$US (millions)



Source: U.S. Census Bureau, http://www.census.gov/foreign-trade/statistics/product/atp/select-atpctry.html.

Figure 19: Royalty and License Fee Payments between China and the United States, 1999–2012
$US (millions)



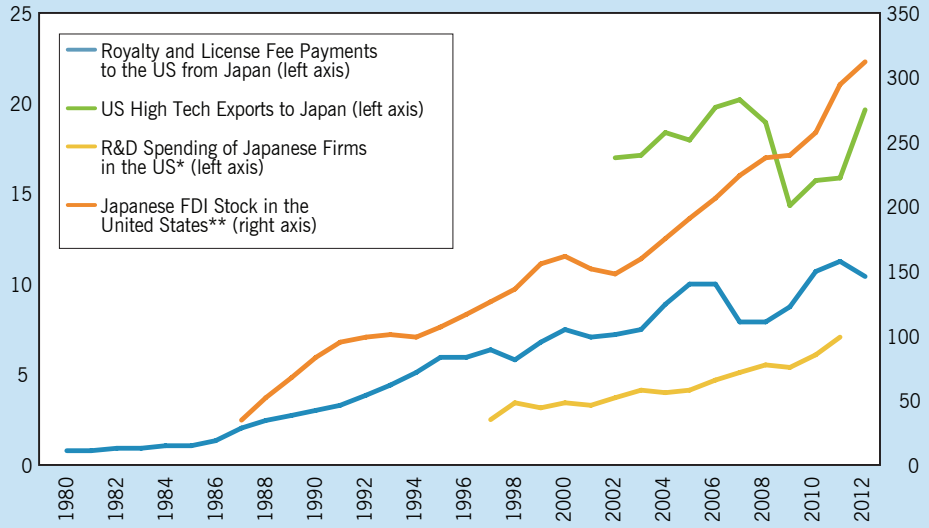
Source: U.S. Bureau of Economic Analysis, International Accounts.

of cutting-edge R&D and production, management techniques. The R&D spending of Japanese firms in the United States increased from virtually zero in the early 1980s to $7 billion in 2011; high-tech exports from the United States to Japan today total $20 billion per year, and royalty and license fee payments from Japan to the United States grew to $10 billion (Figure 20).

The opposite, pessimistic view is that growing Chinese investment in the United States will damage U.S. long-term innovative capacity as it allows China to catch up quicker and move high-value activity back to China. This view presents two questions: First, should we allow Chinese firms to buy U.S. technology despite China's record of IPR violations, corporate espionage, theft of trade secrets, and forced technology transfers? Second, do Chinese firms behave differently from other emerging market players in these regards, or will they have a higher propensity to move innovation-related activities back to China because of industrial policies and a techno-nationalistic gestalt?

With regard to the first question, the reflex to call for restrictions on acquisitions of U.S. technology is understandable, given China's IPR infringement record.[42] Understandable—but not sensible. As for Japan or Korea, China's technological catch-up is a natural process that unilateral restrictions will do little to slow, while poisoning the upsides of transition. Moreover, we believe that FDI is exactly the channel through which this catch-up *should* happen: transparent transactions in which the owner of a technology sets a price for assets. In this sense, we should welcome growing Chinese

Figure 20: Japanese FDI in the United States and Related Economic Flows, 1960–2012
$US (billions)



Source: U.S. Bureau of Economic Analysis; U.S. Census Bureau. *Before 2007, data include only nonbank affiliates.
** Historical cost basis.

[42] For a summary of Chinese intellectual property rights infringements and estimated costs to the U.S. economy, see USITC (2010).

FDI as recognition of the value of innovation and a sign of readiness to pay for it. Embracing the FDI trend will also accelerate compliance with law-based innovation protections. The greater the value of IPR and other intangible assets on the balance sheets of Chinese firms, the more these firms will pressure Beijing for better protection of these assets in China and globally. A larger Chinese investment footprint in U.S. technology also permits U.S. agencies to "reach" Chinese assets in the case of legal enforcement actions. The failed U.S. expansion of one of China's wind energy champions, Sinovel, illustrates this point. Sinovel thrived on the back of Chinese policies to boost homegrown clean energy producers and the alleged theft of intellectual property from U.S.-based supplier AMSC.[43] When the firm tried to expand into the U.S. market, charges by the U.S. Department of Justice against Sinovel and its executives for trade secret theft stymied their plans, creating a sense of consequences for other Chinese firms with global ambitions.

Second, the "headquarters effect" argument that investors might shift value-added economic activity back to China is more complicated. It is a fact that the Chinese government pursues active industrial policies to increase local high-value-added economic activity and that it tries to reach these goals not just through improving local conditions for innovation but also through political requirements that interfere with local and foreign firms' choice of location decisions and partner choices. Examples include joint venture rules in specific industries and indigenous innovation policies.[44] It is also true that micro-management of the financial system, the lack of rule of law, and regulatory regimes for cross-border capital flows give the Chinese government significant *de facto* influence over firms' domestic and overseas investment decisions.[45] These special characteristics of the Chinese economy raise concerns that firms might not follow commercial logic and comparative advantage in building out global value chains but might instead follow government guidance and industrial policy goals.

These concerns are valid, and it is important to monitor firms' behavior overseas in light of the particular Chinese political economy, as well as the changes in that system triggered by announced economic reforms. An empirical assessment of Chinese firms' behavior overall and in high-tech in particular is difficult because of the short track record. However, our CIM dataset allows us to track the behavior of Chinese firms in the United States since the early 2000s; these insights, combined with other data points, help us draw some preliminary conclusions about the behavior of Chinese high-tech investors. We find that Chinese investment in U.S. high-tech industries is generally "sticky" (does not get folded up shortly after initiation) and creates local R&D spending and employment. Similarly, we do not find evidence of Chinese firms systematically acquiring technology assets and then moving capacities to China or other countries.

For a variety of reasons, official statistics do not provide good data on employment by U.S. affiliates of Chinese firms.[46] The CIM dataset allows us to track employment related to each transaction and thus

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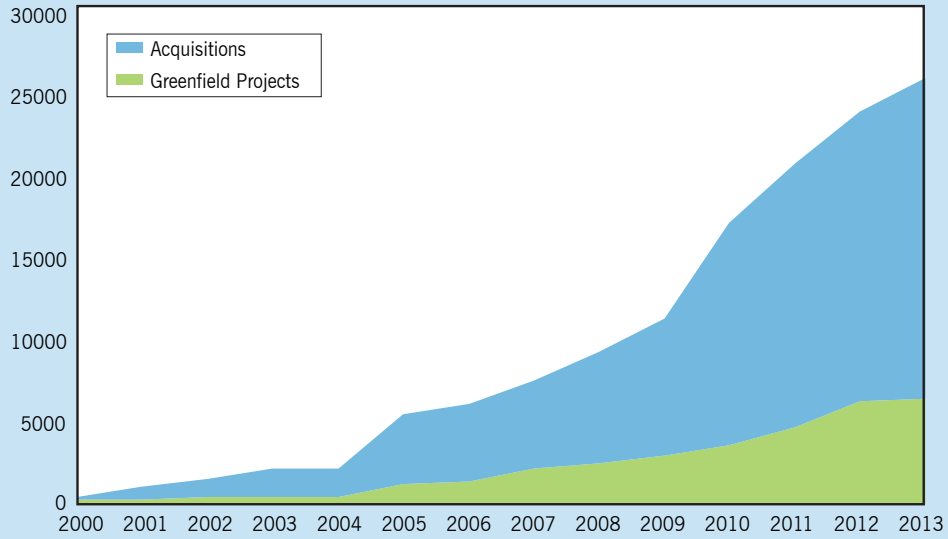
[43] See U.S. Department of Justice, "Sinovel Corporation and Three Individuals Charged in Wisconsin with Theft of AMSC Trade Secrets," news release, June 27, 2013, accessed March 3, 2014, http://www.justice.gov/opa/pr/2013/June/13-crm-730.html.
[44] See, e.g., James McGregor, "China's Drive for 'Indigenous Innovation': A Web of Industrial Policies," accessed February 17, 2014, https://www.uschamber.com/sites/default/files/legacy/reports/100728chinareport_0.pdf.
[45] In fact, key industrial policy players such as the National Development and Reform Commission or the Ministry of Industry and Information Technology are actively involved in approving the outbound investments by Chinese firms in technology sectors.
[46] These problems are discussed in detail in Hanemann (forthcoming).

Figure 21: Full-Time U.S. Jobs Provided by Majority Chinese-Owned Firms in 15 High-Tech Industries, 2000–2013

Number of jobs



Source: Rhodium Group. Numbers are constantly updated and therefore subject to adjustment. A detailed explanation of sources and methodology can be found at http://rhg.com/interactive/china-investment-monitor.

provides an aggregate estimate for the jobs impact of Chinese FDI in the United States.[47] Analyzing the 518 high-tech transactions in our sample, we find that these investments have created or sustained about 25,000 full-time jobs since 2000 (Figure 21). Around 6,000 jobs have been newly created through greenfield projects, and more than 19,000 employees in high-tech industries have come under the payrolls of Chinese firms through acquisitions. The total number of Americans employed by subsidiaries of Chinese high-tech firms, of course, is small compared with the jobs provided by firms from Japan or major European countries, but the trend is strongly positive in recent years.

Job creation through greenfield investments was small initially, but it has grown stronger in the past three years as the nature of greenfield projects has changed. For most of the past decade, greenfield projects were small and mostly focused on export facilitation. In the last five years, Chinese firms have begun to build more expansive greenfield operations, including headquarters, R&D and design centers, after-sales service operations, and small-scale manufacturing facilities. Among the most prominent greenfield investors are Wanxiang, which entered the U.S. market in 1994 and grew into a diversified business employing 6,000 Americans; Haier, which established its first production facility in South Carolina in the late 1990s and today employs about 350 people; Huawei, which employs around 1,900 people at its R&D centers and other facilities in California, Texas, New Jersey, and other locations; and Sany, which runs a manufacturing facility employing more than 130 people in Georgia.

[47] For more background, see Data Appendix and Hanemann and Lysenko (2012).

Compared to greenfield projects, the job impact of acquisitions is less clear in academic literature. M&A deals can be positive for local employment if the investor saves the target from bankruptcy or hires additional staff after the acquisition, but negative if the post-merger integration or restructuring results in the downsizing of local employment or if the investor chooses to extract valuable assets and shut down local operations. Analyzing 150 Chinese takeovers of U.S. firms that we classify as technology or innovation intensive, we find that the jobs impact is overwhelmingly positive. We find many instances in which Chinese firms have saved U.S. technology companies from bankruptcy by providing capital, for example, in the case of auto battery manufacturer A123, auto components maker Nexteer, and general aviation firms Cirrus and Mooney. In most of these cases, Chinese buyers injected additional capital after the acquisition to maintain or increase local staffing (see Table 4).

The few exceptions to these patterns have typically occurred in sunset industries in which the loss of employment can be primarily attributed not to Chinese ownership but to an industry-wide decline in that sector.[48] Thus, while China's new multinationals are not immune to the commercial

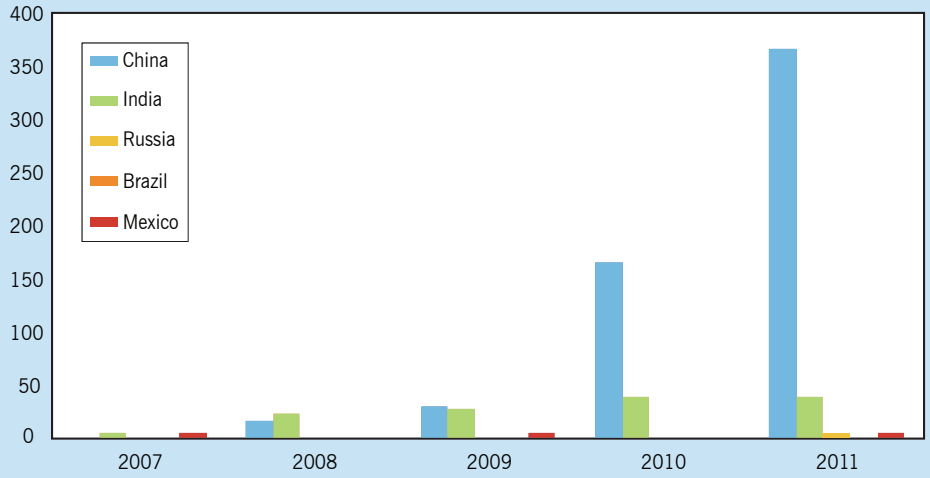
Table 4: Selected Acquisitions by Chinese Firms in High-Tech Manufacturing

Firm	Target (Year)	Job Impact
Pacific Century Motors	Nexteer Automotive (2010)	After plans by General Motors to shut down Nexteer completely, new owner Pacific Century Motors committed to keeping operations in Saginaw and has added more than 600 factory jobs to its original employment base of around 3,000.
Top Eastern Drill	Kennametal assets (2009)	After acquiring steeling drill assets from struggling toolmaker Kennametal, new owner Top Eastern Drill invested millions in new machinery and a logistics center and brought back the firm's old name, Greenfield Industries. The expansion led to a substantial increase in local staff, including workers that have been laid off by the previous owner.
Wanxiang America	Neapco Holdings (2006)	Wanxiang acquired a majority interest in Neapco in 2006. Neapco has since then increased revenues five-fold and now employs more than 2,000 people worldwide, including several hundred in the United States.
Lenovo	IBM PC Division (2005)	When Lenovo acquired IBM's PC division in 2005, more than 2,000 U.S. employees were transferred. Since then, Lenovo has invested millions in new R&D operations, manufacturing operations and a fulfillment center in North Carolina. A joint venture with EMC and the acquisition of Stoneware Inc. in 2012 bring Lenovo's total U.S. employment to more than 2,800.

Source: Authors' compilation based on company information, media reports, and interviews.

[48] Examples include the relocation of jobs by Wanxiang's Coupled Products LLC from Indiana to Mexico in 2008 and the downsizing at Goss International in reaction to slow global demand for printing machinery.

Figure 22: R&D Spending by U.S. Affiliates of Emerging-Economy Firms, 2007–2011
$US (millions)



Source: U.S. Bureau of Economic Analysis, R&D spending by affiliates of foreign multinational companies; data for Brazil, 2007–2011; Mexico, 2008 and 2010; and Russia, 2007–2010 are not available or have been suppressed for confidentiality reasons.

pressures of rationalizing their global value chains, there are no signs yet that industrial policy goals or patriotic doctrines are forcing them to move operations to China. To the contrary, they invest in U.S. greenfield operations and acquire U.S. firms to gain a long-term foothold in one of the world's most innovative economies. The primary value proposition for most Chinese investors is not a quick grab of patents or other removable physical assets but intangible and non-removable assets such as the skills and know-how of staff, management experience, brands, and proximity to local customers.

Another dataset supporting the observation that Chinese firms are ramping up innovation-intensive activities in the United States is the U.S. Bureau of Economic Analysis's statistics on R&D spending by affiliates of foreign multinational companies.[49] While this dataset is likely to underestimate the presence of Chinese firms in the U.S. economy, it still shows a significant increase in R&D spending by Chinese-owned firms, from near zero in 2007 to $31 million in 2009 and to $366 million in 2011 (Figure 22). This is still small in comparison to total R&D spending of foreign affiliates in the United States ($47 billion) and to expenses of major foreign investor such as Japan ($6.95 billion) or Germany ($5.58 billion), but it is a significant increase compared to five years ago. Chinese firms now already match or surpass the R&D spending of firms from smaller developed Asian economies such as Korea ($372 million), Singapore ($255 million), and Taiwan ($143 million). Chinese R&D spending is also significantly larger than local expenditures by any other group of emerging-economy firms in the United States.

[49] There are some caveats to the Bureau of Economic Analysis data and its comparability to our dataset; see Data Appendix.

PEACE DIVIDEND OR NATIONAL SECURITY THREAT?

The third major area of American concern is the impact of Chinese high-tech investment on U.S. national security. Concerns about the security implications of foreign ownership of U.S. assets have come up in connection with many waves of foreign investment in the past. As a geopolitical competitor and the world's second-largest economy, Chinese investment naturally triggers similar concerns.

Foreign investment can be beneficial to a country's national security. Cross-border ownership of assets can stabilize relationships as engagement deepens beyond mere facilitation of goods and services trade. Firms can stop trading with one another in short order, and short-term investments can be withdrawn, but direct factory and warehouse investments cannot be removed overnight. Firms with direct investments are pressed into closer alignment, and FDI promotes understanding on the individual level through multiethnic workforces and collaboration between different cultures.[50] Examples include the role of two-way FDI in sustaining transatlantic political relations after World War II and the role of inward FDI in sustaining Japan's status as an economic partner and geopolitical ally of the United States. Moreover, inward FDI can also strengthen the national security of a country by adding to the innovative and industrial base of its economy.

At the same time, FDI can in theory pose risks to national security. First, FDI can be used to manipulate a country's domestic or foreign policy. This applies particularly to smaller economies with low levels of foreign investment, a situation that makes them vulnerable to political demands by major investor countries. Second, there is a set of concrete national security threats from FDI. International agreements on free cross-border capital flows recognize this and allow countries to impose mechanisms to screen for such risks.[51] While each nation defines what it considers a risk, scholars have identified four particular risks that the United States is concerned about: foreign control over strategic assets (such as ports and pipelines); foreign control over the production of critical defense inputs (such as military semiconductors); the transfer of sensitive technology or know-how to a foreign power with hostile intent; and FDI as a channel for espionage, sabotage, or other disruptive action.[52]

To address these concerns in an otherwise open investment environment, the United States has a special regime that screens foreign takeovers for these narrow national security risks, the Committee on Foreign Investment in the United States (CFIUS). CFIUS consists of nine government agencies and offices, including the U.S. Department of Defense, the U.S. Department of Homeland Security, and the White House Office of Science and Technology Policy. In assessing the impact of foreign acquisitions, they are assisted by other government entities, including the National Security Council, and they are supported by the analysis of the U.S. intelligence community.[53] The legislation that sets the foundation for U.S. screening of foreign takeovers—the

[50] See Mansfield and Pollins (2003) for an overview of liberal and realist arguments on economic interdependence and conflict.
[51] See Yannaca-Small (2007).
[52] See Graham and Marchick (2006) for an extensive discussion of national security risks from FDI and Moran (2009) for an analytical framework for assessing national security risks from foreign investment.
[53] See "Composition of CFIUS," U.S. Department of the Treasury, accessed February 17, 2014, http://www.treasury.gov/resource-center/international/foreign-investment/Pages/cfius-members.aspx.

Defense Production Act of 1950 and the Foreign Investment and National Security Act of 2007—particularly highlights two concerns related to foreign investment in technology. First, there are the potential effects of foreign ownership on "critical technologies" necessary for domestic industries to meet national defense-related needs. Second, there are the potential effects of foreign ownership on the sale of technology or high-tech products and services to a country or entities posing a national security threat to the United States or countries that are considered a risk for proliferation of such technologies to hostile governments or terrorist organizations.[54]

In its assessment, CFIUS does not discriminate against particular countries, nor does it take a sector-specific approach to risk. However, China presents particular concerns with regard to technology sector acquisitions in particular, for at least three reasons.[55] First, unlike other FDI majors such as Japan or the European countries, China is not an ally of the United States but rather an emerging power with a rapidly modernizing military and a stated aspiration to displace the existing global and regional power balance in favor of a greater strategic role for itself. Technological catch-up is seen as key to those objectives.[56] Second, overseas acquisitions could serve as a potential channel for such upgrades, particularly as the government has various ways of influencing firms' investment decision making through either direct ownership or informal ways including the financial system or a mandatory approval process for outbound investments. Third, China is not embedded in mutual defense agreements and has a troubled record on export control rules, as well as a reputation as a major proliferator of sensitive technologies to rogue regimes such as Iran and North Korea.[57]

While an empirical assessment of the national security impacts of Chinese FDI is beyond our capacities, it is fair to say that the CFIUS arrangement has worked well in the past in allowing America's security community to screen for threats while permitting non-problematic transactions to proceed. The number of Chinese transactions reviewed by CFIUS has increased significantly in recent years because of the overall increase in the number of Chinese U.S. transactions and the relative shift toward higher technology sectors (Figure 23). CFIUS has intervened in several announced Chinese high-tech transactions in the United States. In 1990, the president blocked the takeover of Mamco Manufacturing Inc., a manufacturer of aircraft parts, by China National Aero-Technology Import and Export Corporation.[58] In 2009, Huawei and Bain Capital walked away from a takeover of U.S. telecommunications firm 3Com because CFIUS signaled concerns that the companies were not able to mitigate.[59] In 2011, CFIUS ordered Huawei to submit the acquisition of assets from bankrupt U.S. cloud computing start-up 3Leaf and, ultimately, forced Huawei to

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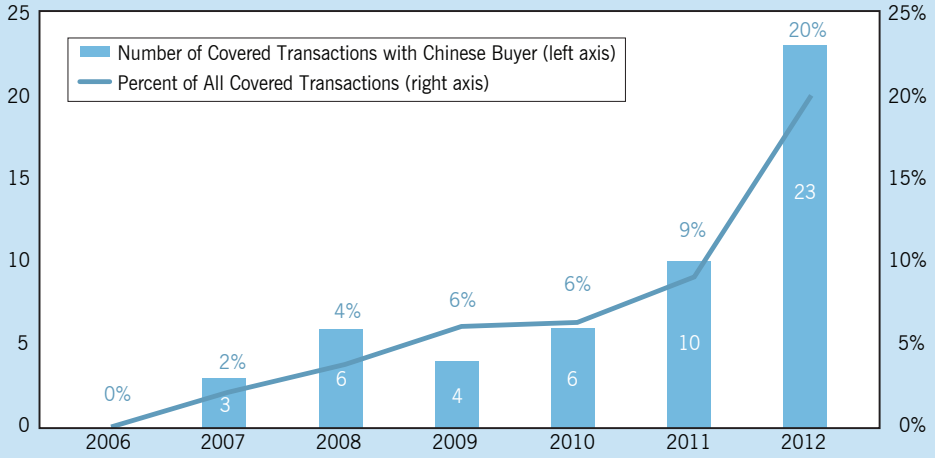
[54] See Foreign Investment and National Security Act of 2007, accessed March 3, 2014, http://www.gpo.gov/fdsys/pkg/BILLS-110hr556enr/pdf/BILLS-110hr556enr.pdf.
[55] This paragraph draws heavily on Graham and Marchick (2006), chap. 4.
[56] See U.S. Department of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2013," accessed February 17, 2014, http://www.defense.gov/pubs/2013_china_report_final.pdf.
[57] See Kan (2011).
[58] Harriet King, "China Ends Silence on Deal U.S. Rescinded," *New York Times*, February 20, 1990, accessed February 17, 2014, http://www.nytimes.com/1990/02/20/business/china-ends-silence-on-deal-us-rescinded.html.
[59] Steven R. Weisman, "Sale of 3Com to Huawei Is Derailed by U.S. Security Concerns," *New York Times*, February 21, 2008, accessed February 17, 2014, http://www.nytimes.com/2008/02/21/business/worldbusiness/21iht-3com.1.10258216.html?pagewanted=all&_r=0.

Figure 23: CFIUS-Covered Transactions Led by a Chinese Buyer, 2006–2012
Number of transactions and share (%) of total



Source: CFIUS Annual Report to Congress, Public Version.

divest these assets.[60] In 2012, a takeover of U.S. aircraft maker Hawker Beechcraft reportedly fell apart because national security concerns could not be mitigated by the parties.[61]

At the same time, CFIUS investigations allow U.S. government officials to approve deals that are found to have no negative impact on U.S. national security and to impose conditions for transactions to mitigate specific concerns. For deals involving basic technologies in the machinery or auto industries, such as Nexteer Automotive or Goss International, CFIUS did not pose a significant hurdle.[62] CFIUS also cleared several aerospace takeovers that did not include technology relevant for defense, including Cirrus Industries and Enstrom Helicopter.[63] Mitigation agreements were imposed on a number of high-tech transactions, including Lenovo's takeover of IBM's PC unit in 2005[64] and Wanxiang's acquisition of the assets of bankrupt U.S. battery maker A123 in 2013.[65]

[60] "Huawei Backs Away from 3Leaf Acquisition," *Reuters*, February 19, 2011, accessed February 17, 2014, http://www.reuters.com/article/2011/02/19/us-huawei-3leaf-idUSTRE71I38920110219.
[61] Mike Spector, "Hawker Sales Talks Collapse over Review Worries," *Wall Street Journal*, October 18, 2012, accessed February 17, 2014, http://online.wsj.com/news/articles/SB10000872396390443684104578064402725144988.
[62] Nick Bunkley, "G.M. Sells Parts Maker to a Chinese Company," *New York Times*, November 29, 2010, accessed February 17, 2014, http://www.nytimes.com/2010/11/30/business/30gm.html; and Matt Whipp, "Shanghai Electric to Take 100% Stake in Goss International," *PrintWeek*, May 19, 2010, accessed February 17, 2014, http://www.printweek.com/print-week/news/1127644/shanghai-electric-100-stake-goss-international.
[63] Norihiko Shirouzu, "China to Buy U.S. Plane Maker," *Wall Street Journal*, March 3, 2011, accessed February 17, 2014, http://online.wsj.com/news/articles/SB10001424052748704728004576176243061806326; and Ernie Stephens, "New Chinese Ownership Brings 'Great Change' to Enstrom," Rotor & Wing, March 22, 2013, accessed February 17, 2014, http://www.aviationtoday.com/rw/commercial/observation-patrol/New-Chinese-Ownership-Brings-Great-Change-to-Enstrom_78775.html#.Up_MdsRDsdo.
[64] "Lenovo to Acquire IBM Personal Computing Division," IBM, news release, December 7, 2004, accessed February 17, 2014, http://www-03.ibm.com/press/us/en/pressrelease/7450.wss.
[65] Michael Bathon, "Wanxiang Wins U.S. Approval to Buy Battery Maker A123," *Bloomberg News*, January 30, 2013, accessed February 17, 2014, http://www.bloomberg.com/news/2013-01-29/wanxiang-wins-cfius-approval-to-buy-bankrupt-battery-maker-a123.html.

IV. IMPEDIMENTS: TOWARD A PRODUCTIVE U.S.–CHINA INVESTMENT RELATIONSHIP

OUR ASSESSMENT SUGGESTS THAT THE UNITED STATES is gaining in terms of consumer choice, local R&D spending, and employment from Chinese investment in advanced activities. Looking forward, China's rise as a global investor and innovator will present additional opportunities. We expect China's outbound FDI stock to grow from $500 billion today to $1 trillion to $2 trillion by 2020.[66] Much of that capital will build innovative capacity; as the most advanced economy in the world, the United States is positioned to attract a significant share of these flows.

Concerns about the impacts of Chinese FDI on national security and other U.S. interests, meanwhile, are legitimate. These already pose a hurdle for Chinese investors and they will become more substantial as investment levels rise unless misgivings are better addressed. Increasing mistrust toward foreign technology in Beijing is raising hurdles for U.S. technology companies operating in China, and that is aggravating the American conversation. In short, there is a real risk of a protectionist downward spiral, which would threaten open, two-way FDI flows in innovation-intensive activities between the two largest economies in the world—a scenario that would bring significant economic welfare losses for all.

In this chapter, we assess the impediments and discuss what policy makers and the private sector can do to work toward a U.S.–China investment relationship that maximizes economic welfare and innovation while addressing legitimate non-welfare concerns. We emphasize three responses that we believe are essential based on our experience tracking China's OFDI evolution: (1) optimizing the mechanisms used to manage national security concerns, (2) integrating China deeper into a market-oriented global innovation system, and (3) developing strategies to sustain America's comparative advantages in global innovation chains through domestic fundamentals rather than a nationalistic approach.

MANAGING NATIONAL SECURITY RISKS APPROPRIATELY

National security concerns have dogged a number of Chinese high-tech investments in the United States, often providing a pretense for politicization. In China, national security concerns have triggered debate about reliance on foreign technology, giving domestic interest groups an opening to lobby for nationalistic approaches to innovation. The potential for protectionism justified on national security grounds is the foremost challenge to a mutually beneficial U.S.–China investment relationship today.

Questions about the national security significance of Chinese investment will inevitably—and legitimately—be raised in the United States, given China's geostrategic and geoeconomic role.

[66] The 2014 global OFDI projection announced at the March 3-11 National People's Congress was just shy of $100 billion, an increase of 10% year on year; so even without further growth in annual flows China will significantly exceed $1 trillion, there is little question.

The United States needs to screen for real security risks while factoring the benefits of Chinese investment and the general value of a liberal international system into the equation. Through the lens of high-tech investment, we see three areas that deserve the attention of U.S. officials and the business community.

First, China's recent readiness to invest in high-tech assets necessitates ensuring that the U.S. investment screening process remains up to date. CFIUS has generally dealt admirably with Chinese acquisition overtures, as with previous generations of investors from other nations. However, a boom in bids by a non-ally with peer potential and a stated objective of counterbalancing American power naturally deserves a stocktaking of existing approaches to assure they are up to new challenges. Complicating this test, the ubiquity and depth of penetration of American (and Chinese) society by high technology today is unprecedented, making the question of adequate hedging against the "security dilemma" that all nations confront doubly difficult to answer. Chinese high-tech investment flows highlight the need to evaluate the optimality of the CFIUS process in several aspects.

The first question is CFIUS's capacity and budget. As the number of Chinese deals in high-tech industries increases, CFIUS will have to deal with more transactions than before, subject to certain deadlines. High-tech deals are prone to be smaller, earlier in stage, and less clear-cut in terms of long-term innovative significance—hence harder to fully understand. No one at CFIUS would have thought that control over a college networking website had strategic implications 10 years ago; today, the question of Facebook's relationship to national security is not beyond contemplation. Both the sheer number of tech start-ups that might be objects of Chinese attention and the obscurity of their potential to mid-level government committee members and their intelligence community briefers raises questions about capacity.

This also highlights the need to reconsider threat perceptions and to be clear about no-go areas for foreign firms. There is inherent flexibility in the U.S. national security screening system, with no "negative list" that explicitly prohibits foreign investment in certain industries. Decisions are made case by case, which allows flexibility and openness. The case of information and communications technology (ICT) equipment, however, has shown that new technologies are changing risk perceptions within security circles. Analysts are on the verge of saying that there *are* redlines around telecommunications; some already say so. Does it still make sense, then, for U.S. officials to insist that the United States does not have a negative list, if, in practice, it appears to? If the United States *is* to ring-fence whole industries, then it is better to save everyone time and formally define those no-go zones, along with careful justifications.[67] And if exclusions are limited to certain countries or types of regimes, we need to be transparent about that as well. This is important not just for potential Chinese acquirers but also for U.S. consumers and firms, so that the ambiguity hanging over their vender options is removed and they can plan accordingly. In the case of ICT equipment, for example, manufacturing value chains are profoundly global, and it

[67] Importantly, such alterations to the recipe for success CFIUS has traditionally employed would require changes to US law.

would be critical for firms to start planning for the added expense if we were to de-globalize our telecom infrastructure, as the costs would likely be enormous.[68]

A related concern is the opacity of the national security screening process. CFIUS traditionally has been permitted to operate with a high degree of opacity to protect classified intelligence information and the confidentiality of involved parties. A concern related to this opacity is that, shielded from public accountability, members of the committee might be prone to political or vested interest pressure to view a transaction in negative terms. Some relatively modest Chinese high-tech acquisitions have already caused confusion over the logic and criteria for CFIUS decisions, for example, in the case of the Huawei-3Leaf transaction in February 2011. As the number of Chinese high-tech acquisitions grows further, there is greater risk that officials will feel pressure to "guard American innovation" and take a reactive, overly conservative stance on deals in the absence of a more transparent check on their judgment. And even in cases in which there are legitimate concerns, the lack of transparency may provoke foreign allegations of internal bias. One way to address this concern would be to make the CFIUS process more transparent with regard to its decision-making process and criteria, for example, through more substantial and frequent reporting. Another option would be to ensure effective oversight of the process by high-level officials with accountability and awareness of both narrow national security concerns and the full strategic significance of two-way investment flows.

Recent growth in high-tech acquisitions also emphasizes—conversely—the importance of *shielding* the CFIUS process from external politicization. U.S. firms and special interest groups have, at times, been tempted to use national security arguments to fend off potential Chinese competitors, in particular when it comes to high-tech transactions.[69] Members of Congress regularly grandstand about technology losses through Chinese investment, even when it comes to non–national security matters such as animalbreeding. This has perpetuated a constant fear of legislative action to either expand the definition of our economic security interests or craft unique resolutions to impede specific deals. A large industry of "helpers" has sprung up to invoice Chinese firms for aiding them in managing these political risks. While managing government relations is a normal part of doing business in the United States and around the world, we must be careful that Washington does not start to look like Beijing in terms of needing special "relationships" to get normal business done, which is precisely the kind of situation that U.S. firms are hoping to *change* in China—and China's leaders, in fact, are trying to remedy.

In addition to CFIUS, a second investment-related issue needing U.S. attention is export controls. These rules influence the decisions of Chinese firms on U.S. advanced manufacturing operations. American companies have long complained that the complex and often ineffective U.S. export

[68] For a first take on national security and globalized IT supply chains, see Moran (2013).
[69] A recent example is the takeover of battery manufacturer A123 by Wanxiang. In that case, national security was used by Wanxiang's competitors and related lobby groups as a pretense to influence public opinion; see Rachel Feintzeig, "Talking SMAC," *Bankruptcy Beat*, January 10, 2013, accessed March 3, 2014, http://blogs.wsj.com/bankruptcy/2013/01/10/talking-smac/.

control regime is a disadvantage for them in global competition.[70] These concerns are particularly acute in markets in which U.S.-based firms compete with firms from countries with less strict regulations, such as China.[71] In industries subject to such restrictions, the United States will be at a disadvantage in attracting investment from Chinese firms that are looking at the option of producing high-tech goods abroad for the Chinese market. Existing restrictions and compliance costs could divert investment in advanced manufacturing to economies with a similar factor endowment but with less burdensome rules, such as Canada or advanced European and Asian economies. Options are to further streamline the export control regime to bring down compliance costs and better coordination with other advanced economies (most of which are military allies of the United States) about export controls to avoid a race to the bottom.[72]

Third, it is in America's interest to minimize the use of ad hoc, extralegal mechanisms for dealing with national security interests. There may be legitimate grounds for excluding Chinese suppliers from certain U.S. markets, but authorities need to be up-front about restrictions so that a clear assessment of costs and benefits can be performed. If government agencies or major companies—for example, in telecommunications infrastructure—are to be barred entirely from purchasing equipment from Chinese firms, then that injunction needs to be legal, not based on ad hoc action.[73] Ad hoc approaches are known to underestimate consumer welfare costs, the cost of retaliation against U.S. firms in other markets, and the redirection of FDI to other countries.

U.S. leadership in demonstrating sound national security review processes is particularly important today because China's own regimes are in transition. China's inward FDI regime, which has required extensive political approvals for the past 4 decades (and was closed entirely for the 30 years before that) is under reform, to a regime allowing foreign firms to more freely invest in the Chinese economy, subject only to a more limited "negative list" of restricted sectors, merger control rules, and national security screening. China recently created its own regime to screen inbound M&A for national security threats.[74] The regime has not been applied yet, as other extant mandatory approvals make it superfluous. Once it becomes operational, it will be critical for China to apply this regime in an internationally consistent way and to minimize abuse by special interests.

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[70] A 2007 report funded by the U.S. Department of Defense found that export control rules "are becoming a matter of concern for U.S. firms and represent a unilateral disadvantage to U.S.-based firms" and, in some cases, are "encouraging R&D and capital investment overseas." See Institute for Defense Analyses, "Export Controls and the U.S. Defense Industrial Base," 2007, accessed March 3, 2014, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA465592. See also the position of the U.S. National Association of Manufacturers on this issue, accessed March 3, 2014, http://www.nam.org/Issues/Trade-Regulation/Export-Controls.aspx.

[71] The Export Compliance Working Group, consisting of members of the American Chamber of Commerce in China, estimates that U.S. firms face financial losses of billions of dollars every year to foreign competitors that are not subject to the same rules; see "High-Tech Trade Promotion and Export Controls," accessed March 3, 2014, http://web.resource.amchamchina.org/cmsfile/2011/04/25/94520f91b6ad941e0c421a37938bc1df.pdf.

[72] For a summary of existing deficiencies in the U.S. export control regime and reform proposals, see Ian F. Fergusson and Paul K. Kerr, "The U.S. Export Control System and the President's Reform Initiative," Congressional Research Service, January 13, 2014, accessed March 3, 2014, http://www.fas.org/sgp/crs/natsec/R41916.pdf.

[73] For an example of such ad-hoc action, see: "Locke Says Sprint's Chief Was Called About Huawei Bid Concerns," Bloomberg, December 7, 2010, accessed March 15, 2014, http://www.bloomberg.com/news/2010-12-07/commerce-s-locke-says-sprint-s-chief-was-called-about-huawei-bid-concerns.html

[74] See the "The General Office of the State Council Announcement on Establishment of Foreign Investor Merger and Acquisition of Domestic Enterprises Security Review Scheme," accessed March 3, 2014, http://www.gov.cn/zwgk/2011-02/12/content_1802467.htm.

The same applies to a range of other national security–related areas that affect inward FDI and the operations of foreign firms in China. Beijing must resist attempts to use communications surveillance revelations as an excuse for a techno-nationalist "de-Westernization" of technology markets in China, to benefit not security but indigenous commercial interests. It is in China's own national interest to reject such calls and instead to work toward national security policies that are transparent and that allow China to maintain the past benefits of integration with global production chains.

STRENGTHENING THE CONSENSUS FOR A MARKET-DRIVEN SYSTEM

The second major impediment to U.S.–China openness in high-tech investment is the debate over nonmarket elements in China's economy and asymmetries in market access. Concerns about the advantages enjoyed by Chinese firms in global competition, lack of reciprocity in market access, and industrial policy biases have been voiced in connection with many Chinese high-tech acquisitions in the United States. Such concerns have already prompted restrictive new rules in other Chinese partner economies, notably Canada and Australia, and there are calls in the United States to expand the scope of CFIUS or to erect new regimes to screen for potential *competitive* threats from Chinese investment. Addressing these concerns will be necessary to sustain a productive U.S.–China investment relationship.

China's goal of upgrading its national technology and innovation capacity is understandable and, in principle, legitimate. However, the range of measures that it has applied to achieve this goal are not all compatible with the equally legitimate interests of other nations. Similar to other developing countries in the past, China has relied on various industrial policies, including subsidies, protection of domestic industries through import tariffs, lax enforcement of IPR, and technology transfer requirements for joint ventures and market access.[75] As China now reaches middle-income status and its firms become globally competitive – with market shares to prove it—China must revise its economic policy mix. While not all Chinese firms will benefit from that graduation beyond developing nation policies, China's leaders know that national welfare already requires this shift and are pursuing a rapid reform course.

Most centrally, China's new leadership has vowed to move beyond many of the residual nonmarket elements applied in the past and to accelerate the transition to a new development model. If implemented as announced, these economic reforms will address many foreign concerns about the competitive impacts of Chinese FDI: a reform of China's inward FDI regime toward a modern approach with a negative list will improve market access for foreign firms and increase reciprocity in openness; a more flexible outbound FDI regime will allow Chinese firms to make completely autonomous decisions about global value chains and limit the role of government in approving overseas operations; financial sector reforms will lead to more market-based interest rates and capital costs; state-owned enterprise reforms will strengthen corporate governance and capital

[75] For a summary of policies perceived as illegitimate from the U.S. perspective, see USITC (2010).

discipline of state-owned firms and make them more transparent; and legal reforms will strengthen rule of law and protection for IPR.[76]

The United States should recognize China's efforts and support the announced reforms. At the same time, questions remain about whether China can deliver progress fast enough. Therefore, U.S. leaders needs to be prepared to react if reforms do not materialize or move too slowly and explore available options including the application of domestic frameworks, erection of new frameworks to screen foreign investment, and accelerating international regime building. Our long-standing position is that border barriers such as "economic security" screening are a second-best solution or even counterproductive, given their costs and implementation hurdles and the inherently multilateral quality of high-tech production chains today.[77] The incorporation of an economic benefits test into CFIUS reviews would significantly increase costs for government and firms, pose significant challenges to measuring economic impacts in a fast-changing world of innovation, and open the door to politicization and manipulation of transactions. Similarly, outright demands for reciprocity in openness do not make sense, as the United States should welcome investments in local innovative capacity (once tested for narrow national security concerns) independent of China's openness.

A better solution is to rely on existing domestic regimes and international frameworks to encourage Chinese reform. With regard to domestic frameworks, the United States has a strong competition policy regime, and merger controls and other post-market-entry regimes can be used to address concerns about acquisitions with negative impact on market concentration or uncompetitive behavior.[78] Existing frameworks to protect IPR and trade secrets are also an efficient way to address concerns, and the local presence of Chinese firms further increases the options for U.S. authorities and private sector firms to sanction violations rather than diminishing them. Similar tools include stricter enforcement of current rules against trade secrets theft and stronger legislation to target individuals and firms tied to such practices. The example of Chinese wind turbine manufacturer Sinovel illustrates how the United States can effectively use existing laws to discipline Chinese companies that rely on technology stolen from U.S. interests.[79] Cases such as Sinovel send a strong warning to Chinese firms that such tactics will poison their reputations globally.

U.S. leadership on multilateral agreements is an important complement to domestic policy. Initiatives such as the Transatlantic Trade and Investment Partnership, the Trade in Services Agreement, and the Trans-Pacific Partnership (TPP) can serve as platforms for the United States for improving global rules on intellectual property protection, setting technology standards, open trade and investment policies, and market-based innovation systems.[80] China's participation and collaboration

[76] For an English summary of the Third Plenum reform decisions, see "Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform," January 16, 2014, accessed March 3, 2014, http://www.china.org.cn/china/third_plenary_session/2014-01/16/content_31212602.htm.
[77] See, e.g., Rosen and Hanemann (2011).
[78] For details on U.S. competition policy, see the Federal Trade Commission's guide, accessed March 3, 2014, http://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws.
[79] See U.S. Department of Justice, "Sinovel Corporation and Three Individuals Charged in Wisconsin with Theft of AMSC Trade Secrets," news release, June 27, 2013, accessed March 3, 2014, http://www.justice.gov/opa/pr/2013/June/13-crm-730.html.
[80] For information on the Transatlantic Trade and Investment Partnership, see http://www.ustr.gov/ttip; on the Trade in Services Agreement, see http://www.regulations.gov/#!documentDetail;D=USTR_FRDOC_0001-0270; on the Trans-Pacific Partnership, see http://www.ustr.gov/tpp, all accessed March 3, 2014.

in these efforts would be more constructive than agreements excluding China. For that reason, National Security Advisor Susan Rice said, "We welcome any nation that is willing to live up to the high-standards… to join and share in the benefits of the TPP, and that includes China."[81] Chinese president Xi Jinping has laid out a domestic reform agenda that is compatible with participation in these next-generation agreements; however, if China fails to achieve its self-defined goals, these agreements will serve as a hedge against the negative implications. In this regard, congressional passage of Trade Promotion Authority to empower the executive branch to pursue such agreements takes on an added importance.[82]

BUILDING AND SUSTAINING COMPARATIVE ADVANTAGES

A third ingredient for sustained U.S.–China investment openness is national confidence about future potential. Both China and the United States harbor uncertainties about the distributional impacts and benefits of globalization. It is critical that both countries take the right steps to be confident about an internationalist rather than a nationalist approach to technology value chains. China needs to successfully transition from a developing to an advanced economy approach to nurturing innovation and must provide the right institutional framework for this next stage of economic growth. The United States needs to implement necessary reforms to sustain its technology leadership at home and thus maintain its confidence.

China has many of the prerequisites for leadership in global innovation. However, for China to be confident about its role in an open and market-based global innovation system, it needs to create the necessary institutions to make the transition from a planned economy legacy to a modern national innovation system. A joint assessment by the OECD and China's Ministry of Science and Technology outlined the cornerstones for such reforms in 2007, but little progress has been made on many of these imperatives: adjusting the role of the government from industrial policy to provision of public goods and correcting market failures, improving the governance of science and technology policy, following an innovation-oriented and nondiscriminatory public procurement policy, improving IPR protection, fostering market competition, improving corporate governance, and increasing the efficiency of capital markets.[83] It is not hard to argue that some of these factors, such as capital market efficiency, have gotten *worse* over the past half-decade. Xi Jinping's Third Plenum program for Chinese reform identifies the challenges for action to catch up to rhetoric; the world is watching to see whether that cognizance translates to action.

On the U.S. side, confidence is similarly necessary to keep growing Chinese investment a positive story. At their core, U.S. concerns about Chinese FDI in innovation-intensive industries reflect

[81] Remarks by National Security Advisor Susan E. Rice, Georgetown University, November 20, 2013, accessed March 3, 2014, http://www.whitehouse.gov/the-press-office/2013/11/21/remarks-prepared-delivery-national-security-advisor-susan-e-rice.
[82] As of this writing, the U.S. Senate has introduced such a bill. See U.S. Senate Committee on Finance, "Baucus, Hatch, Camp Unveil Bill to Bring Home Job-Creating Trade Agreements," news release, January 9, 2014, accessed March 3, 2014, http://www.finance.senate.gov/newsroom/chairman/release/?id=7CD1C188-87F1-4A0B-8856-3FC139121CA9. The bill was cosponsored by outgoing Senate Finance Committee chair Max Baucus, who was confirmed as the American ambassador to China in February.
[83] For details, see OECD (2007). Although the report captures the reality in 2007, the analysis and policy recommendation are still valid in our eyes.

anxiety about the loss of U.S. technology leadership. The popular and political reactions to Chinese overtures reflect that concern clearly. However, closer scrutiny of FDI from China and other foreign countries will do little to defend U.S. technology leadership—in fact, by shutting out new competitors and future technology spillovers, it could hurt. The solution is to ensure that the United States remains a highly attractive place for innovation-intensive activities. The most common recommendations by experts and businesses to ensure long-term U.S. competitiveness are improving the U.S. education system, particularly science, technology, engineering, and math capabilities; increasing federal funding for basic research and development; reforming the U.S. corporate tax system; creating a more efficient health care system; modernizing outdated U.S. infrastructure; establishing a more effective patent system; and modernizing the immigration regime.[84] Implementing such reforms is the best guarantee for attracting "good" FDI from China and elsewhere, instead of short-term investments that are aimed at quick transfer of technology.

[84] See U.S. Department of Commerce (2012); Council on Competitiveness (2005); European-American Business Council and Information Technology and Innovation Foundation (2011); Hufbauer and Vieiro (2013); and OECD (2012).

V. CONCLUSIONS AND RECOMMENDATIONS

IN THIS REPORT, we have analyzed the dimensions, patterns, and drivers of Chinese FDI in U.S. high-tech industries. While still at an early stage, these flows have grown from a trickle to more than $1 billion annually since 2010. The year 2014 looks to be a milestone, with more than $6 billion of transactions completed or pending in the first quarter. This surge in Chinese high-tech FDI comes at a difficult time for U.S.–China economic relations in technology and innovation. Many Americans are suspicious about China's readiness to comply with the norms of a market-based global system. This view is rooted in the perception that predatory Chinese trade practices and IPR theft have contributed to the loss of manufacturing capabilities and jobs and that Beijing's innovation policies are a continuation of old industrial policies that discriminate against foreign firms. In China, revelations about U.S. surveillance programs have triggered calls for banning foreign technology and a nationalist approach to innovation and technology.

The trajectory of Chinese high-tech FDI in the United States will be an important factor in determining the path forward for the U.S.–China relationship. Successful investments will help Americans appreciate the benefits of new and more two-way investment interaction China and will remind Chinese leaders that reciprocity in FDI openness and IPR protection are in China's own interest. Troubled Chinese investment forays and impediments to foreign firms in China, on the other hand, may lead to a backlash. Such a negative U.S. response would aggravate existing tensions and empower proponents of a more nationalist and discriminatory approaches to technology on both sides. Public and private sector leadership will be required to avoid such a scenario. We offer a few recommendations for each side toward that goal.

RECOMMENDATIONS FOR U.S. POLICY MAKERS AND BUSINESSES

1. Acknowledge China's arrival as high-tech investor: Many policy makers and businesses are still new to the fact that China is now a major U.S. investor, and they struggle to imagine that Chinese firms could be major contributors to local innovation. As our data show, they already are. Many local economies now benefit from Chinese capital flows and related job creation. The readiness of Chinese firms to invest in such operations opens up great opportunities for mayors and governors to attract FDI and revitalize struggling companies, but they need to do their homework to match their states and cities with the right investors. The U.S. business community will have to carefully consider the opportunities and challenges of this shift in Chinese investment interests for their operations at home and abroad.

2. Ensure that CFIUS remains effective: For decades CFIUS has fulfilled its mandate well: screening for narrowly defined national security concerns in inward acquisitions so as to clear the way for general openness to foreign investment flows. Now more than ever, such a gatekeeper is

necessary to establish confidence that openness to China entails no unmanageable risks. However, in a democracy few institutions are immune from political pressure and mission creep, and the sensitivity of relations with China today is so great that officials are prone to hypersensitivity. The opacity granted to CFIUS, combined with rapid growth in China-related deal flow, raises the risk that the narrow standard of what constitutes a legitimate national security concern may widen. Such risks should be headed off by clear guidance from the Office of the President (CFIUS's ultimate audience) in terms of the committee's role. Transparency in more frequent CFIUS reporting on technology-related concerns, better disclosure of procedures and results, and frankness in terms of cases withdrawn prior to being rejected have been suggested as ways to provide greater confidence to applicants that the committee is not biased against Chinese investment. These and other confidence-building measures that do not impinge on the committee's necessary insulation from outside second-guessing should all be considered.

3. Reassess other investment-relevant elements of U.S. security policy: The emergence of investors from emerging markets and the growing complexity of global innovation value chains highlight the need to evaluate other elements of U.S. national security policy. One area is the U.S. export controls regime, which has been a drag on the global competitiveness of U.S.-based firms for a long time and will put U.S. locations at a disadvantage in competition with European or Asian economies for legitimate greenfield investments from China. The United States should accelerate the reform of its export control rules and coordinate technology export control regimes with allies to avoid a race to the bottom in the competition for Chinese investment. A second area is market access restrictions for Chinese technology goods. It may be legitimate to ban Chinese goods from government agencies or infrastructure projects, but such restrictions will affect the location decisions of Chinese firms and, most likely, lead to retaliation against U.S. firms in China. If market restrictions are deemed necessary from a national security perspective, they need to be narrow, codified, and transparent.

4. Utilize domestic frameworks to address economic and commercial concerns: The greater presence of Chinese firms in the United States through FDI gives American regulators an opportunity to oversee and influence the behavior of those firms, as well as options for sanctioning abuses should they occur. Instead of expanding CFIUS reviews to "economic security" questions or erecting a burdensome at-the-border regime, the United States should use its ample domestic regimes—including competition policy or trade secrets laws—to address economic concerns such as fair competition. The greater physical presence and assets of Chinese firms in the United States will in fact give U.S. companies a greater ability to use the U.S. court system for pursuing their interests in technology-related disputes with Chinese firms, such as copyright and intellectual property rights (IPR) violations.

5. Push for a bilateral investment treaty and international regimes to incentivize upward convergence: A bilateral investment treaty between China and the United States will not be guarantee a level playing field overnight, but it provides a detailed template for improving China's inward FDI regime and testing China's degree of readiness. At the same time, the United States

should continue its leadership on issues including IPR protection, transparency, and supervision of nonmarket distortions internationally. Initiatives including the Transatlantic Trade and Investment Partnership, the Trade in Services Agreement, and the well-advanced Trans-Pacific Partnership all have a part to play. If reforms proceed quickly, then China can look forward to an early on-ramp to these agreements; if they fall short, then international investment covenants will serve as a safety net for market economies and an incentive for convergence.

6. Tackle reforms to ensure long-term U.S. competitiveness in innovation-intensive activities: Our analysis shows that the United States is attractive to Chinese firms because it is the world leader in many cutting-edge technologies and offers firms an environment they cannot find elsewhere, based on factors that are not movable, such as the right institutional environment and highly qualified and educated workers. The way to keep these firms in the United States and attract more of them is to sustain these advantages and make the United States a more attractive place for knowledge-intensive activities than its peer competitors in Europe or Asia. Barriers to foreign investment will do nothing to improve these domestic fundamentals, and Washington must guard against the misconception that a tighter external firewall will repair American competitiveness—in fact it could easily impair it further.

RECOMMENDATIONS FOR CHINESE POLICY MAKERS AND BUSINESSES

1. Acknowledge foreign concerns: Foreign concerns about the impact of Chinese OFDI are neither fantastic nor simply protectionist. For the most part, these worries are an extension of unsettled debates about distortions and imbalances in China's home economy. American anxieties about the character of China's behavior in the context of high technology in particular are not surprising, given Beijing's extensive official indigenous innovation programs couched in nationalistic terms, talk of "de-Westernizing" Chinese technology, recent setbacks in an expanded Information Technology Agreement as a result of Chinese foot-dragging, and a history of aggressive technology theft by Chinese firms both at home and abroad. China is not unique in any of these blemishes—American firms have sinned in similar ways at times—but if Beijing wants to optimize investment market access abroad today, then the onus is on China to change these perceptions.

2. Make a down payment on broad market reforms: The aggressive economic reform program laid out by the Third Plenum of the Communist Party in November 2013 is a big step forward, but uncertainty remains about what path the leadership intends to take on innovation and technology and whether they can implement those intentions. By making a "down payment" on reform, Beijing can demonstrate what kind of future foreign partners can expect and make it easier to get past current misgivings about high-tech OFDI. Examples of confidence-building early-harvest moves with regard to innovation include lower barriers to foreign participation in technology and service sectors in China or the abolition of nationality-based discrimination in technology-relevant industrial policies.

3. Take bolder steps on China's specific inward FDI regime: A prime determinant of foreign appetite for Chinese FDI in technology is the treatment of foreign firms in China. The faster China

moves from the current approval system to a modern FDI regime, the more easily U.S. leaders and businesses can advocate for reciprocal openness. Within this new regime, the list of restricted sectors should be narrow and transparent, and informal barriers should be minimized. Beijing must assure partners that vested commercial interest groups cannot use self-interested nationalistic or security agendas to foil legitimate foreign competition in technology sectors. A revised and radically slimmed down negative list of sectors to be exempted from general openness, in the context of both the new Shanghai Free Trade Zone and the US-China BIT negotiations, is the singular indication of boldness that foreign observers are looking for..

4. Unleash the private sector: China has made great strides in the transition from a government-dominated economy to a market economy, and it is private firms and entrepreneurs that are now driving outbound FDI in technology sectors. However, private innovators need a better legal environment at home, as well as more freedom to make unfettered decisions about global operations. Beijing needs to simplify outbound investment rules and give up the idea that it can "guide" firms in their global investment decisions. Cutting back the role of industrial policy behemoths such as the National Development and Reform Commission and the Ministry of Industry and Information Technology in the approval process will not only make firms more competitive but also ease foreign fears about politically involved investment decisions. Conversely, China's private sector needs to step up and stand on its own instead of letting the Ministry of Commerce and state media represent their interests. The best way to counter politicization of investments is to educate local stakeholders about motives and communicate successes more effectively on the firm level or through a private business association or chamber of commerce. China's business community must also work to positively influence its own government and join the U.S. business community in becoming a stabilizing factor for two-way openness and economic integration.

5. Provide greater leadership on investment-related international regime building: After three decades as a major recipient of inward FDI, China's recent emergence as exporter of FDI has led to greater interest in international agreements that promote openness and investor protection. The readiness to engage in negotiations of bilateral investment treaties with the United States and European Union indicate this sea change. As the world's second-largest economy and now one of the top exporters of FDI globally, China needs to take a leadership role in the future in designing and expanding multilateral regimes that promote investment openness. Ultimately, China could become a powerful force in the revival of a multilateral agreement on investment (such as failed to come to fruition in the past). China's changing global investment interests, combined with changes in the domestic political economy, should also increase the urgency for China to promote or join related international agreements, for example, the World Trade Organization's government procurement agreement and the Information Technology Agreement.

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DATA APPENDIX

Global Capital Flows and FDI

In national accounting statistics, cross-border investment flows are commonly separated into five categories: direct investment, portfolio investment, derivatives, other investment, and reserves.[85] By definition, direct investment entails cross-border capital flows that achieve significant influence over the management of an invested entity and a long-term investment relationship. The common threshold for a direct investment is 10% of voting shares. Portfolio investment refers to a typically shorter-term investment in liquid securities that constitutes no control, for example, holdings of equity shares with less than 10% of voting rights or corporate debt instruments. Derivatives refer to financial instruments such as swaps, futures, and options, which are only contractually related to the underlying value of real assets such as firms or commodities.[86] Other investment entails all flows that do not fall into the previous categories, such as foreign bank deposits, currency holdings, cross-border loans, or trade credits. Finally, reserves are highly liquid instruments held by governments or central banks in the form of gold, foreign exchange, or special drawing rights at the International Monetary Fund (IMF).[87]

Foreign direct investment flows can include three components: equity investment, reinvested earnings, and other capital flows. A direct investment relationship usually starts with an equity injection into an overseas company, either for the establishment of a new overseas subsidiary (greenfield investments) or the acquisition of a significant stake (greater than 10%) in an existing company (mergers and acquisitions). All subsequent capital flows between the parent company and the foreign subsidiary are counted as direct investment, including profits that are reinvested in the subsidiary (reinvested earnings) and other capital flows between the two firms (such as intercompany debt).[88]

Available Data Sources for Global FDI Flows

A range of different measures and sources are available for tracking global FDI flows. Most countries compile balance of payments (BOP) statistics that include information on annual inflows and outflows for each type of cross-border investment and related income flows. The corresponding numbers for

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[85] See the IMF's Balance of Payments and International Investment Position Manual (2009). The IMF definitions also are used by other international organizations such as the Organisation for Economic Co-operation and Development and the United Nations Conference on Trade and Development.

[86] The new category of derivatives was introduced in the sixth edition of the IMF's Balance of Payments and International Investment Position Manual, released in 2009.

[87] See IMF (1993).

[88] Detailed information on the nature of direct investment and its measurement can be found in the OECD's "Benchmark Definition of Foreign Direct Investment" (OECD 2008a).

the inward and outward stock of each category—the accumulated flows adjusted for exchange rate and valuation changes—are recorded in countries' international investment position statistics. The IMF uses these figures as reported by its member states to compile global financial statistics.

In addition to national accounting statistics that capture aggregate flows with the rest of the world based on IMF standard definitions, many countries publish additional datasets that provide a more disaggregated view of their investment relationships with other economies. Several international organizations, such as the United Nations Conference on Trade and Development (UNCTAD) and the Organisation for Economic Co-operation and Development (OECD), also collect data on FDI and other cross-border investment flows. However, those figures are mostly based on input by national governments and are not independent calculations.[89]

Known Problems with FDI Data

Problems with the timeliness, accuracy, and international comparability of available measures for FDI are widely known.[90] One major problem is that statistical authorities have different capacities and experience in collecting information and processing data. Countries use very different methodologies for collecting data, they often lack the capacity for making the relevant adjustments from historical to market value, and the pace of data processing differs greatly.

Another problem is that the use of holding companies and offshore vehicles has increased tremendously in recent years, and the extent of "round-tripping" (whereby companies route funds to themselves through countries or regions with generous tax policies and other incentives) and "trans-shipping" (whereby companies channel funds into a country to take advantage of favorable tax policies, only to reinvest those funds in a third country) makes it increasingly difficult to track flows accurately. Those practices and complicated deal structures with "indirect" holdings also make it difficult for statistical agencies to correctly separate FDI from portfolio investment stakes. The result is that comprehensive international FDI statistics are usually published with a delay of 1.5 years or more. Moreover, data from home and host countries are often inconsistent with each other, and global aggregate data on FDI assets and liabilities do not match. These problems make a holistic real-time assessment of global FDI flows increasingly difficult and require analysts to find ways of working around existing gaps and distortions.

Challenges in Measuring Chinese Capital Outflows

Problems with collecting and disseminating FDI data are a global phenomenon, but they particularly apply to FDI flows to and from emerging economies. Local statistical offices often do not have the manpower or adequate training for collecting detailed and accurate data on FDI flows and the operations of transnational enterprises.[91] In addition, emerging-economy investors often have

[89] For more detailed information, see Patterson et al. (2004).
[90] For an overview, see for example UNCTAD (2005a).
[91] UNCTAD (2005b).

additional incentives to use offshore holding companies because of existing capital controls or the lack of adequate financial and legal structures at home. The case of Chinese FDI statistics illustrates these problems.

In China, FDI statistics are compiled by two government agencies. The State Administration of Foreign Exchange (SAFE), China's foreign exchange regulator under the People's Bank of China, is responsible for collecting and publishing FDI data used for China's balance of payments and international investment position statistics. In compiling such data, SAFE follows the principles outlined in the fifth edition of the IMF's *Balance of Payments Manual*.[92] SAFE's data are published on a quarterly and annual basis. The second government agency involved in FDI data compilation is China's Ministry of Commerce (MOFCOM), which publishes monthly data on outbound FDI by nonfinancial companies. MOFCOM also takes the lead for publishing a statistical annual bulletin on Chinese outbound FDI in cooperation with SAFE and the National Bureau of Statistics, which provides detailed breakdowns of Chinese OFDI by country and industry.[93]

The first difficulty with China's system lies in understanding the roles of the two agencies and reconciling differences between their data. In recent years, China has streamlined its OFDI statistical system with both agencies responsible for different parts of data collection but working with the same definition of FDI, as summarized in a statistical manual on outbound FDI that is updated every two years.[94] In theory, China's OFDI figures should be based on MOFCOM's outward FDI reporting system for nonfinancial companies and SAFE data on OFDI by financial companies and reverse investment flows. In practice however, the dual-agency system continues to complicate compilation and dissemination of China's OFDI data. The two agencies separately publish monthly, quarterly, and annual data on their respective parts as well as total FDI, showing significant discrepancies—for example, as of August 2013, MOFCOM recorded $87.7 billion in OFDI flows in 2011, while SAFE only recorded $65.8 billion in gross outflows and $48.4 billion in net outflows for the same year (the latter of which should be seen as appropriate figure according to internationally accepted definitions). Both agencies reconcile their stock figures during annual data revisions, but the discrepancies between annual flows persist (Figure A-1).

A second problem is that official Chinese FDI statistics are not suitable for an in-depth analysis of distribution by industry or country because they do not accurately capture the final destination of outflows. The increasingly common use of offshore financial centers is a global trend, but Chinese firms have even greater incentives to use special offshore purpose vehicles to structure their investments because of insufficient legal and financial systems at home, existing capital controls, and burdensome regulatory requirements for outbound investors.

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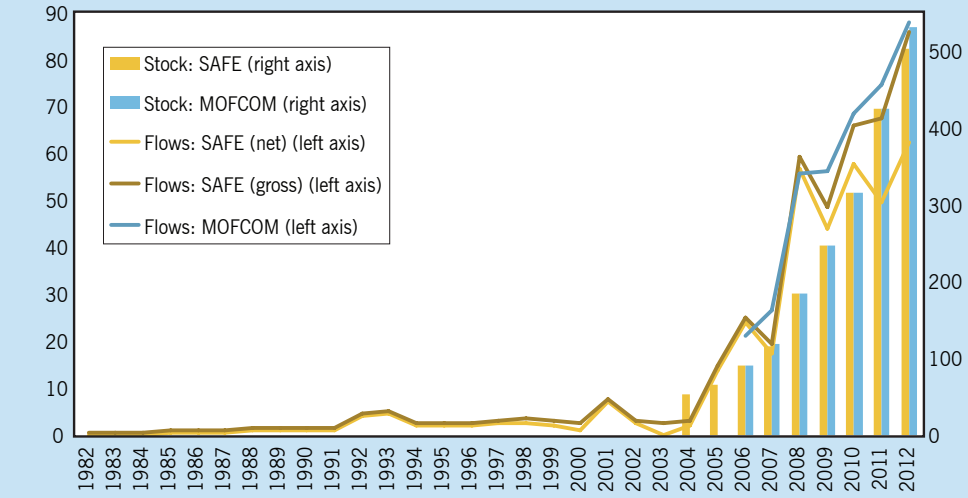
[92] For detailed information on the fifth edition of the IMF's Balance of Payments Manual, see IMF (1993). IMF General Data Dissemination System (GDDS) on China is available at http://dsbb.imf.org/pages/gdds/ComprehensiveFwReport.aspx?ctycode=CHN&catcode=BPS00, accessed February 17, 2014.

[93] See the official summary of the 2012 China Outward Foreign Direct Investment Statistical Bulletin, September 2013, accessed February 17, 2014, http://www.mofcom.gov.cn/article/ae/ai/201309/20130900292811.shtml.

[94] 2012 China Outward Foreign Direct Investment Statistical Procedure, accessed February 17, 2014, http://www.mofcom.gov.cn/article/b/bf/201212/20121208507450.shtml.

Figure A-1: Chinese Outbound FDI, 1992–2012 (Official Chinese Data)
$US (billions)



Sources: Ministry of Commerce; State Administration of Foreign Exchange.

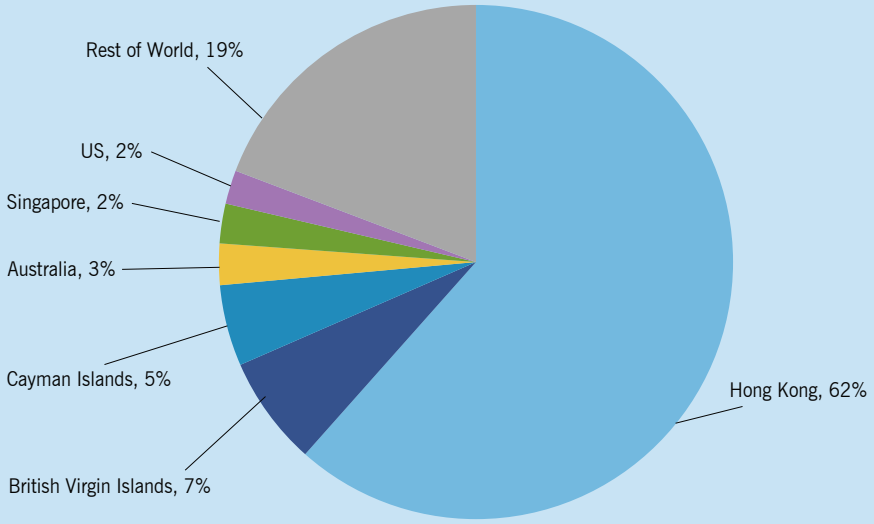
While Chinese statistical agencies have made improvements to create more transparency, the current official data on the distribution of China's outbound FDI stock must be seen as unreliable snapshot. According to MOFCOM, more than 70% of China's 2011 outbound FDI stock was registered in either Hong Kong or tax havens such as the Cayman Islands or Bermuda (Figure A-2). Similar problems are apparent in MOFCOM's statistics on the industry distribution of China's OFDI stock, where "business services" is the biggest category (34% of total OFDI stock in 2011) and mining only accounts for 17% of the total—a stark contrast to observed deal patterns around the globe.

Data from host countries can offer an alternative perspective on Chinese outbound investment, though these mirror data display similar problems and shortcomings. Since 2009, the IMF has run a new initiative to improve the quality and availability of global FDI data, the Coordinated Direct Investment Survey (CDIS).[95] One of the CDIS datasets presents mirror data for a country's outward FDI stock based on the inward FDI stock reported by partner economies. The resulting data hint that Chinese official data may be too low, with 87 countries in the CDIS survey reporting a stock of $510 billion at the end of 2011 (Figure A-3), compared to China's official OFDI stock of $425 billion for the world in the same year.

However, the CDIS data are not very useful for analyzing the patterns of China's global OFDI, as they are compiled according to direct counterpart economies and not ultimate beneficiary

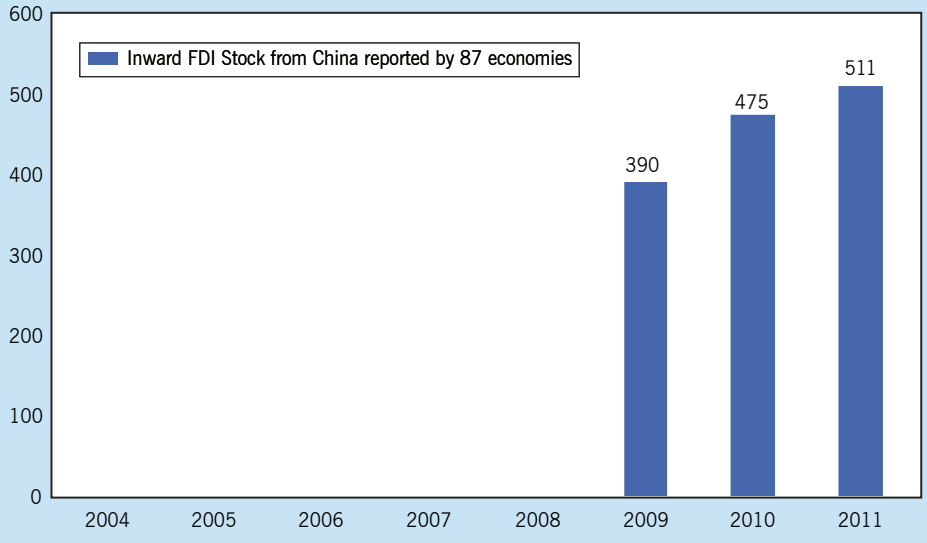
[95] CDIS is available at http://cdis.imf.org/, accessed February 17, 2014.

Figure A-2: China's OFDI Stock by Country, 2011 (MOFCOM)
Share (%) of total OFDI Stock



Source: Ministry of Finance.

Figure A-3: Reported Inward FDI Stock from China, 2009–2011 (IMF CDIS)
$US (billions)



Source: International Monetary Fund, Coordinated Direct Investment Survey.

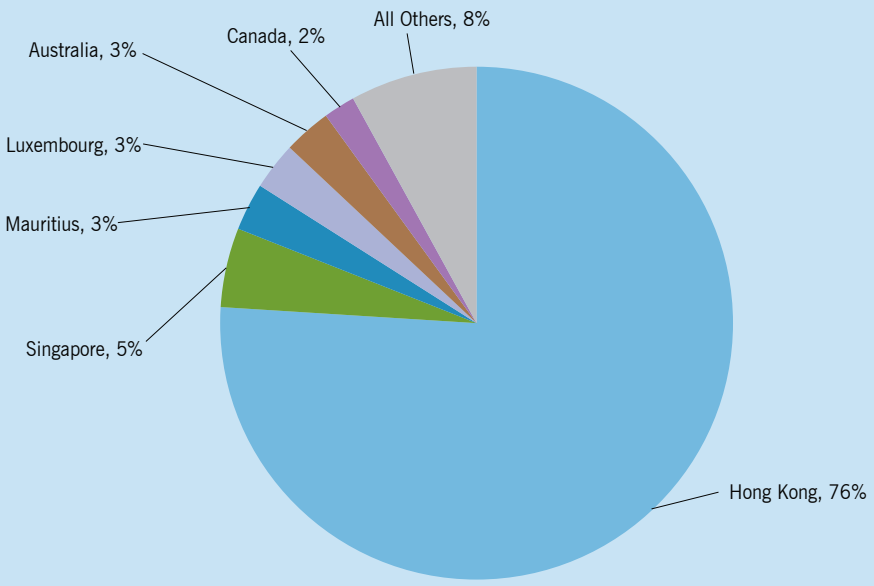
ownership, which means that Hong Kong and financial centers with favorable tax environments such as Luxembourg or Mauritius are again dominating the picture (Figure A-4). In short, mirror data offer a useful additional perspective, but unless host countries present data on an ultimate beneficiary ownership principle, these data do not help to better understand the global distribution of Chinese OFDI.

Alternative Approaches and Datasets to Measure Chinese OFDI

Given the problems with quality, accuracy, and timeliness, official data from both China and recipient countries are not sufficient for an in-depth, real-time analysis of Chinese investment patterns. This is particularly true for policy research, which requires timely information for decision makers. Therefore, researchers have to come up with alternative approaches to improve the understanding of the scope and direction of Chinese overseas investment.

In recent years, several think tanks, academic institutions, and private sector firms have come up with alternative solutions to help address those shortcomings and further improve the transparency of China's global investments. Most of those datasets are based on a bottom-up approach of collecting data on individual transactions or companies.[96]

Figure A-4: China's OFDI Stock by Country, 2011 (IMF CDIS)
Share (%) of total OFDI Stock



Source: International Monetary Fund, Coordinated Direct Investment Survey.

[96] In addition to the RHG dataset, there is the Heritage Foundation's China Investment Tracker, which tracks China's global nonbond investments, but only those with a value of $100 million and more.

The RHG Dataset on Chinese FDI in the United States

Rhodium Group (RHG) has developed two datasets that provide a comprehensive picture of Chinese direct investment transactions in the United States and the European Union, which served as a basis for two major studies on the patterns and impacts of Chinese investments in both economies. The RHG China Investment Monitor (CIM) is a dataset that aims to provide a comprehensive picture of Chinese direct investment transactions in the United States. It currently covers the period from 2000 to the present. Data are updated on a quarterly basis and made available to the public in aggregate form, together with commentary on recent patterns and specific transactions and policy developments.[97]

Data are compiled from a transactional bottom-up approach, which relies on the aggregation of relevant transactions into a headline figure, as well as various metrics of interest. Relevant transactions are defined as investments by mainland Chinese firms that qualify as direct investment under common international definitions, that is, greenfield projects or acquisitions of stakes in existing companies that exceed the FDI threshold of 10%.

The RHG dataset is compiled through several steps:

First, raw data on outbound investments by ultimately Chinese-owned firms in the United States are collected. The data mining relies on a wide range of channels, including commercial databases, online search algorithms, media reports, regulatory filings, company reports, industry associations, official sources, investment promotion agencies, industry contacts, and other sources. As there are hundreds or even thousands of small-scale FDI transactions every year that are impossible to follow, the minimum value for individual deals included in the database is $500,000.

Second, completed deals that formally qualify as direct investment (following the generally accepted threshold of 10% of equity or voting shares) are separated from portfolio investment transactions (stakes of less than 10%), and detailed information on each investment is collected. Pending and withdrawn deals are excluded. Acquisitions are added to the list at the date of their completion; greenfield projects are added at the date of their announcement (but only if there is clear evidence that they have broken ground). The deal values are added based on either the officially announced investment volume or the most convincing analyst estimates; total deal values for M&A transactions include equity investment as well as debt assumption. Deals without reliable estimates are included in the database with a zero value.

Third, each FDI transaction is coded with additional variables such as source state, employment, target state, or ownership of investing company. For ownership, we apply a conservative threshold that requires 80% or more private ownership to qualify as private enterprise. Employment data are retrieved directly from company sources or estimated based on similar transactions, revenue, industry, and other data points. Each deal is then assigned an industry category based on the main

[97] See http://rhg.com/topics/cross-border-investment, accessed February 17, 2014.

activity of the greenfield facility or target firm, using an industry category system derived from the Standard Industrial Classification (SIC).

Finally, during each update, past deals and existing operations are screened again in order to ensure that changes in investment amount, employment, or other relevant metrics are captured in the newest version of the database. Therefore, our data are never final but instead are subject to constant updates.

The CIM dataset provides a real-time perspective on Chinese FDI transactions in the United States. By recording investment flows from the bottom up, several problems are avoided—most importantly, the significant time lags and distortions resulting from extensive use of pass-through locations—making the dataset useful for a real-time assessment of aggregate investment patterns, as well as the distribution of those investments by industry, modes of entry, geographical spread, and ownership. However, the data resulting from a transaction-based approach are not directly comparable to FDI statistics compiled according to balance of payments principles.[98] As such, the CIM data cannot be used to analyze balance of payments-related problems and other issues based on the national accounting framework.

The combined value of our FDI transactions is generally higher than the annual FDI flows shown in official statistics from the U.S. Bureau of Economic Analysis and China's Ministry of Commerce, for the following reasons: First, as opposed to official BOP data, we track investments back to the ultimate beneficiary owner. BOP data usually track flows back to the immediate source country and therefore miss Chinese FDI routed through Hong Kong and other offshore financial centers. Second, our definitions and accounting slightly differ from the BOP rules. The most important differences are that we count the total value for M&A transactions (including assumed debt) and do not separate financing from the Chinese parent company and financing provided by local U.S. partners; we do not account for reverse flows back to China, for example, through intracompany transactions or divestures; there may be differences in counting transactions that are at the edge between portfolio and direct investment flows (most importantly commercial real estate transactions and nonoperating stakes in extractive industries).

Employment Estimates

Official statistics do not provide good information on employment provided by U.S. affiliates of Chinese firms, for the same reasons mentioned earlier. The CIM dataset allows us to track employment related to each transaction and thus provide an aggregate estimate for the jobs impact of Chinese FDI in the United States.[99] Our estimates only include direct full-time jobs and do not count temporary part-time staff. We also only count employment at U.S. subsidiaries with Chinese majority ownership, which means that our figures do not include employment provided by firms in which Chinese investors hold a minority interest (for example, passive stakes in energy or utilities).

[98] For more information, see the IMF's Balance of Payments Manual, 5th edition, accessed February 17, 2014, https://www.imf.org/external/pubs/ft/bopman/bopman.pdf.
[99] For more background, see the Data Appendix and Hanemann and Lysenko (2012).

Table A-1: Classification Systems for Knowledge- and Technology-Intensive Industries

System	Type of Data	Basis	Coverage	Data Source	Data Preparation
High-technology manufacturing industries	Production and value added	Industry by International Standard Industrial Classification (ISIC)	Aerospace, pharmaceuticals, office and computing equipment, communications equipment, scientific instruments	United Nations Commodity Trade Statistics and IHS Global Insight	IHS Global Insight, proprietary special tabulations
Knowledge-intensive service industries	Industry production (revenues from services), in current dollars	Industry by International Standard Industrial Classification (ISIC)	Business, financial, communications, health, and education services	United Nations Commodity Trade Statistics and IHS Global Insight	IHS Global Insight, proprietary special tabulations
Trade in high-technology products	Product exports and imports, in current dollars	Product by technology area, harmonized code, country of origin, and destination	Aerospace, pharmaceuticals, office and computing equipment, communications equipment and scientific instruments	United Nations Commodity Trade Statistics and IHS Global Insight	IHS Global Insight, proprietary special tabulations
U.S. trade in advanced technology products	U.S. product exports and imports, in current dollars	Product by technology area, harmonized code, country of origin, and destination	Biotechnology, life sciences, optoelectronics, information and communications, electronics, flexible manufacturing, advanced materials, aerospace, weapons, nuclear technology, software	U.S. Census Bureau, Foreign Trade Division	U.S. Census Bureau, Foreign Trade Division, special tabulations
U.S. trade in commercial knowledge-intensive services	U.S. exports and imports, in current dollars	Type of service, country of origin	Business, financial, and communications services	U.S. Bureau of Economic Analysis	U.S. Bureau of Economic Analysis
Globalization of U.S. multinationals	Value added and direct investment position, in current dollars	North American Industry Classification (NAICS), in country of origin and destination	Business, financial, and communications services, aerospace, pharmaceuticals, office and computing equipment, communications equipment, scientific instruments manufacturing	U.S. Bureau of Economic Analysis	U.S. Bureau of Economic Analysis
U.S. trade in intangibles	U.S. receipts and payments, in current dollars	Type of intangibles and industrial processes	Total intangibles and industrial processes	U.S. Bureau of Economic Analysis	U.S. Bureau of Economic Analysis
Patents	Number of patents for inventions, triadic patents (invention with patent granted or applied for in the U.S., European, and Japanese patent offices)	Technology class, country of origin	More than 400 U.S. patent classes, inventions classified according to technology disclosed in application	U.S. Patent and Trademark Office (USPTO) and Organisation for Economic Co-operation and Development (OECD)	USPTO, the Patent Board, and OECD
Angel capital	Funds invested by U.S. angel investors	Technology	Biotechnology, electronics, financial services, health care, industrial/energy, information technology, media, telecommunications	Center for Venture Research, University of New Hampshire	Center for Venture Research, University of New Hampshire
Venture capital	Funds invested by US venture capital funds	Technology area defined by data provider	Biotechnology, communications, computer hardware, consumer related, industrial/ energy, medical/health, semiconductors, computer software, Internet specific	National Venture Capital Association	Thomson Financial Services, special tabulations

Source: National Science Foundation

We also do not include indirect job creation related to the construction of facilities or at suppliers. The jobs figures are estimated based on a thorough review of every firm in our proprietary database. The number of full-time employees at each firm is estimated based on official company information, regulatory filings, company profiles in professional databases, and innovative online strategies such as professional networking websites.

Classification of High-Tech Industries for this Report

There is no single preferred or internationally accepted method for classifying high-technology industries. Table A-1 provides an overview of commonly used classifications. The OECD offers high-technology industry definitions based on research intensity or R&D spending as a percentage of total sales. In this system, high-technology industries are defined by ISIC (International Standard Industrial Classification) industry codes. In the United States, the Bureau of Labor Statistics (BLS) also compiles a list of high-technology industries based on R&D employment intensity of an industry. The BLS list is compiled using NAICS (North American Industry Classification System) industry codes. The European Union mostly relies on a classification that is similar to the OECD's system but uses NACE (Nomenclature des Activités Économiques dans la Communauté Européene) industry codes. In the absence of one globally accepted definition, researchers have to pick the approach or definition that is best suited to their analytical goals.

For the analysis in this report, we broadly follow the OECD principles to break down the 26 industry categories used in the CIM database. The CIM dataset is based on 26 industry categories derived from SIC industry categories. Following the OECD's system of high-tech manufacturing and innovation-intensive services, we divide these 26 industries into 15 high-tech and 11 low-tech industries (Table A-2). The most important caveats for such an approach are that it is fairly broad and that it does not allow us to distinguish between lower- and higher-value-added activities (e.g., a simple administrative office is counted the same as high-tech investment as long as it occurs in an industry defined as high tech). We address this problem by separately analyzing the motives and adding a second layer of analysis.

Taxonomy of FDI Drivers

There is an abundant body of academic literature on the drivers and motives of foreign direct investment. Economic theories explaining FDI and location decisions by multinational enterprises were developed by pioneers such as Stephen Hymer, Charles Kindleberger, and John H. Dunning and refined by following generations of researchers.[100] The scholarship of motivations for outbound FDI by firms from developing and emerging economies is still fragmented, and it is often limited to qualitative case studies on individual firms.[101]

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[100] For a good summary of FDI theories, see Moran and Oldenski (2013, 19ff).

[101] See, e.g., the Harvard Business School case studies "Haier: Taking a Chinese Company Global," August 23, 2011, accessed Feburuary 17, 2014, http://hbr.org/product/haier-taking-a-chinese-company-global-in-2011/an/712408-PDF-ENG; and "Lenovo: Building a Global Brand," July 19, 2006, accessed February 17, 2014, http://hbr.org/product/Lenovo--Building-A-Global/an/507014-PDF-ENG.

Table A-2: RHG Classification of High-Tech Industries

Included	Not Included
Aerospace Equipment and Components	Farming, Logging, and Husbandry
Automotive Equipment and Components	Food Processing and Distribution
Other Transportation Equipment	Metals and Minerals
Chemicals	Consumer Product and Services
Renewable Energy	Coal, Oil, and Gas
Financial Services and Insurance	Utilities
Business Services	Hospitality and Tourism
Pharmaceuticals and Biotechnology	Entertainment, Media, and Publishing
Plastic, Rubber, and Other Materials.	Real Estate
Health Care and Medical Devices	Construction Services
Industrial Machinery and Tools	Transportation Services
Electronics and Electronics Parts	
IT Equipment	
Software and IT Services	
Semiconductors	

Source: Rhodium Group. Tertiary sectors marked in blue.

Table A-3: Taxonomy of FDI Motives

Natural-Resources-Seeking FDI
Investments to gain access to particular natural resources that are not available or abundant at home or diversify supply of these resources
Market-Seeking FDI
Investments to facilitate access to overseas markets for goods or services
Strategic-Asset-Seeking FDI
Investments to acquire or build existing strategically important assets that strengthen a firm's long-term competitiveness such as technology, brands and distribution channels
Efficiency-Seeking FDI
Investments that allows firms to reorganize their global operations to take advantage of different factor endowments, market structures, and institutional environments
Return-Seeking FDI
Investments that are primarily made for financial returns but that exceed the 10% threshold for FDI

Source: Authors' compilation based on Dunning (1993).

In this report, we attempt to systematically review and quantify the motives for Chinese firms' investment in U.S. high-tech industries.[102] For this purpose, we use a taxonomy of FDI drivers derived from the work of John H. Dunning. Dunning (1993) identified four primary motives for firms investing overseas: resource-seeking, market-seeking, strategic-asset-seeking, and efficiency-seeking motives. While Dunning's work has been augmented and refined by others over the past two decades, we believe this basic taxonomy still provides a useful framework for understanding what is driving Chinese FDI in the United States. In order to account for the increasing importance of passive quasi-portfolio stakes in global FDI, we added a fifth category of return-seeking FDI (see Table A-3 for an overview).

By coding each of the 518 deals in our high-tech sample with one or multiple of these motives, we are able to capture the evolution of motives for U.S. high-tech investments. Because multiple drivers may motivate an investment decision, the coding is not exclusive, and each deal may be coded with one or more motives. The coding was primarily based on public documents, including company announcements, regulatory filings, press releases, analyst reports, and quotes of related executives and other stakeholders. When such information was unavailable or insufficient, we subjectively coded the respective transaction considering the company's situation in the marketplace and specific industry dynamics. Each transaction was independently coded by three different reviewers to minimize the subjectivity of such decisions. The coding of individuals transactions was based on a review of public information and company announcements using the following definitions and keywords:

Resource-Seeking FDI

Firms invest overseas to get *access to resources* they need for their products that are not available at home and to diversify their supply of these materials. In most cases, that concerns stakes in upstream natural resource operations such as ores, energy, or other raw materials. An example is Suntech Power's acquisition of a stake in Hoku Scientific, a U.S. supplier of polysilicon. Deals are coded as resource seeking if the U.S. target company is a supplier of a key natural resources or basic materials.

Key words: Resources, oil and gas, timber, metals, rare earths, polysilicon, basic materials, upstream, extractive, supplier. (资源， 石油和天然气， 木材， 金属， 稀土， 多晶硅， 基础材料， 上游， 采掘， 供应商)

Types of U.S. operations: Upstream resource extraction, basic processing of resources.

Market-Seeking FDI

Firms invest overseas to seek *new markets* for their products and services. If their home market is not growing fast enough or if they have unique advantages such as lower costs or higher quality, firms can enter overseas markets through trade and FDI. Often, exporting products to foreign markets requires local presence and operations, for example, sales offices or after-sales services. Sometimes,

[102] This exercise explicitly looks at commercial motivations for U.S. investments based on each company's commercial inc

it makes commercial sense to give up trade and build local production facilities. And sometimes political hurdles or requirements (tariffs, local content requirements) force firms to invest in local operations instead of using trade channels. Examples include investments by Haier and Lenovo in local manufacturing facilities or Chinese service providers such as Air China and China Shipping. Deals are coded market seeking if a Chinese investor already has a significant customer base in the United States, wants to expand into the U.S. market (first operation), or wants to defend its market share by localizing production.

Key words: Sales, exports, clients, customers, supplier, localization, after sale customer service, market, customer, marketing. (销售，出口，客户， 顾客， 供应商， 本土化， 售后客户服务， 市场，客户， 市场营销)

Types of U.S. operations: Sales offices, representative offices, after-sales operations, final assembly and other manufacturing, provision of modern services.

Strategic-Asset-Seeking FDI

Firms also use FDI to acquire *strategic assets* that enhance their long-term competitiveness. The most commonly sought-after after strategic assets are knowledge (including intellectual property, technology, and industry knowledge), distribution channels, and brands. Strategic-asset-seeking FDI mostly comes in the form of acquisitions and is an attractive way for developed-economy firms to enter new industries. It is also often used by emerging-economy firms to play catch-up. Examples are the acquisition of IBM's PC business by Lenovo, the purchase of Enstrom Helicopter Corporation by Chongqing Helicopter Investment, and the acquisition of ZONARE Medical Systems by Mindray Medical International. Deals are coded as strategic asset seeking if Chinese firms acquire assets such as IPR, experienced staff, management knowledge, distribution channels, and brands or if the target firm operates in a different industry in which the buyer is not present.

Key words: Capacity, technology, knowledge, leaders, experts, distribution channels, brands, patents, IPR. (能力，技术，知识， 领导者，专家，分销渠道，品牌，专利， 知识产权)

Types of U.S. operations: Existing R&D facilities, sales and distribution assets, patents and brand assets, innovation-intensive operations, manufacturing and production facilities.

Efficiency-Seeking FDI

Firms invest overseas with the goal of achieving *greater efficiency* of their global operations. Often, this type of FDI comes in the form of greenfield investment, and it is used by firms aiming to streamline their existing global operations to take advantage of different factor endowments (such as human talent or access to financing), market structures, and institutional environments (such as mature IPR, financial, and legal environments). For example, a Chinese auto firm may invest in U.S. R&D operations to tap into the local talent base, or a major Chinese tech firm may invest in a U.S. office to raise financing in U.S. capital markets. Deals are coded as efficiency seeking if the Chinese

buyer is looking to build long-term U.S. operations with the goal of making up for input factors that are scarce at home but abundant in the United States, including human talent, experience, innovation-supportive capital markets, and a sound legal environment. Investment decisions based on changes in relative factor costs in China and the United States (energy, labor, land) would also fall into this category.

Key words: Human talent, system, research, R&D, design, global operations, adequate, environment, mature, IPR protection, financial markets, regulatory environment. (人才， 体系， 科研， 研发，设计， 全球运营， 完善，环境，成熟，知识产权保护，金融市场， 监管体系)

Types of U.S. operations: Greenfield research and development centers, greenfield manufacturing and production facilities, expansion of existing local operations, headquarters, administrative offices.

Return-Seeking FDI

In addition to these four motives, it makes sense to add a fifth motive, return seeking. Today, many institutional and private investors hold passive stakes in companies that would qualify as FDI because they exceed the 10% threshold and the investors can exert control, but they are purely for the purpose of long-term capital gains. Examples are the alternative investment portfolio of China's sovereign wealth fund China Investment Corporation in the United States (such as AES) and Alibaba's recent stake in Shoprunner. Deals are coded return seeking if they end up in a noncontrolling stake with the goal of long-term capital returns. Often such deals are done by sovereign funds, institutional investors, conglomerates, or private equity firms.

Keywords: Passive stake, private equity, financial stake, venture capital, early stage, seed financing, initial public offering. (被动股权，私募投资，金融投资，风险投资， 早期， 种子融资，首次公开发行)

Types of U.S. operations: Start-up companies, real estate, utilities, renewable energy projects.

Future Data Updates

Rhodium Group's dataset on Chinese FDI transactions in the United States is constantly updated and therefore subject to change. The most recent dataset can be found on the China Investment Monitor website, which allows users to track Chinese direct investment transactions in the United States by state and industry: http://rhg.com/interactive/china-investment-monitor.

Asia Society Reports on Chinese Investment Into the United States

An American Open Door? Maximizing the Benefits of Chinese Foreign Direct Investment (April 2011)

Chinese Direct Investment in California (October 2012)

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