THE HENRY L. STIMSON CENTER

Foreign High-Tech R&D in China

RISKS, REWARDS, AND IMPLICATIONS FOR U.S.-CHINA RELATIONS

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Cover design by Design Army.

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Foreword

I am pleased to present the latest publication of the Henry L. Stimson Center, *Foreign High-Tech R&D in China: Risks, Rewards, and Implications for US-China Relations*. This study explores the confluence of two key aspects of the architecture of international relations in the 21st century—globalization and an increasingly trade-oriented conception of national security—within the specific context of foreign high-tech research and development in China. As the study explains, global R&D is a relatively new mechanism of technology transfer with potentially great economic and security implications for all parties involved. The study examines the nature of this global trend and weighs the risks assumed and rewards conferred by this activity for both national governments and multinational corporations. The report proposes useful steps that the United States and other countries can take to better understand and monitor global R&D and avoid outcomes that could prove harmful to US national and economic security interests in the years to come.

This study adds a new dimension to the Stimson Center's core mission to examine national and international security issues by exploring the increasingly important linkages between trade and security. It also complements the Center's ongoing work on China: its evolving role in the international system and its relations with the United States. While this study focuses its R&D story on implications for the US-China relationship, the issue is really broader and global in its potential impact.

It is our hope that this study will be helpful in focusing attention on the nexus between trade and security and in deepening our knowledge of a new trend that will shape future trade and security policies. The Project Director, Kathleen Walsh, and I are grateful for the support we received from the Smith Richardson Foundation for this project.

We will welcome hearing from you if you have any questions about this project or other work on Asian security issues at the Stimson Center.

Ellen Laipson
President and CEO
The Henry L. Stimson Center

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Abbreviations and Acronyms

3G	Third-generation
3GPP	Third Generation Partnership Project
AeA	American Electronics Association
CAS	Chinese Academy of Science
CCF	China-China-Foreign (telecom industry partnership)
CDMA	Code Division Multiple Access
CERNET	China Education and Research Network
COSTIND	Commission on Science and Technology in the National Defense (PRC)
DOC	Department of Commerce
DoD	Department of Defense
DVD	Digital Versatile Disc
ETDZ	Economic and Technological Development Zone
EU	European Union
FBIS	Foreign Broadcast Information Service
FDI	Foreign Direct Investment
FTZ	Foreign Trade Zone
GAD	General Armament Department (PRC)
GDP	Gross Domestic Product
GERD	Gross Expenditure on R&D
GSM	Global System for Mobile Communications (telecom)
HDTV	High-definition Television
HTDZ	High Technology Development Zone
HTS	Harmonized Tariff Schedule
ICT	Information Communications Technology
IT	Information Technology
IPR	Intellectual Property Rights
KIP	Knowledge Innovation Program (CAS)
JV	Joint Venture
MII	Ministry of Information Industry
MNC	Multinational Corporation

MOFTEC	Ministry of Foreign Trade and Economic Cooperation*
MOST	Ministry of Science and Technology (PRC)
NAICS	North American Industrial Classification System
NERC	National Engineering Research Center
NSB	National Science Board
NSF	National Science Foundation (US)
NSFC	National Natural Science Foundation (PRC)
NSI	National System of Innovation
NTE	New Technology Enterprise
OECD	Organization for Economic Cooperation and Development
PCAST	President's Council of Advisors on Science & Technology
PDA	Personal Digital Assistant
PLA	People's Liberation Army (PRC)
PNTR	Permanent Normal Trade Relations
PRC	People's Republic of China
R&D	Research and Development
SAPI	Strategic Action Plan for S&T Innovation
SCITO	State Council Informatization Office
SEZ	Special Economic Zone
SIC	Standard Industrial Classification
SIPO	State Intellectual Property Office (PRC)
SITC	Standard International Trade Classification
S&T	Science and Technology
TD-SCDMA	Time Division–Synchronous Code Division Multiple Access (telecom)
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
US	United States
W-CDMA	Wide-band Code Division Multiple Access (telecom)
WFOE	Wholly Foreign-Owned Enterprise
WTO	World Trade Organization

* This Ministry is to be folded into the new Ministry of Commerce, as announced following the 2003 session of the Chinese National Peoples' Congress.

Acknowledgments

This publication would not have been possible but for the support, assistance, guidance, and insights of numerous colleagues, friends, and others. While many of those interviewed and consulted for this study cannot be identified since their insights were given confidentially, their contribution to this work and the author's understanding of rapidly changing conditions in the China market were invaluable. The findings, views, and any errors presented in this publication, however, are solely those of the author.

For the able research and administrative assistance provided by Scoville Fellow Jonathan Davis as well as by research interns Ji Huishu, Sarah Terbrueggen, and Richard Pearson, the author is especially grateful.

This project also would not have started, much less been completed, were it not for the assistance, advice, and generosity of numerous colleagues at the Henry L. Stimson Center, whose support from beginning to end was greatly appreciated.

Finally, particular appreciation goes to the Smith Richardson Foundation, whose generous support and willingness to take a chance made this study possible.[1]

[1] This effort was sponsored by the Smith Richardson Foundation under Grant No. 20011895. The views and conclusions contained herein are those of the author and should not be interpreted as representing the official policies or endorsements, either expressed or implied, of either the Stimson Center or the Smith Richardson Foundation.

Executive Summary

Commercial research and development in high-tech industries has become an increasingly global undertaking. Over the past two decades, the number of US and other overseas R&D centers has multiplied, although it is unclear exactly how far and how fast this trend is developing due to the still very limited data on this phenomenon. What is clear is that these activities have spread from the industrialized economies to parts of the developing world. The People's Republic of China, in particular, has attracted scores of foreign-funded, high-tech R&D investment from around the globe, particularly in sectors related to information communications technology. This report examines the emergence and evolution of foreign-invested R&D centers in China with a focus on the computer and telecommunications industries. The study's key findings include the following:

- Globalization and the international distribution of high-tech R&D have aided China's efforts to develop its commercial industry. Increasingly, foreign investors are competing with local high-tech enterprises for market share in the computer and telecommunications sectors.

- During nearly two decades of reforms and restructuring, PRC officials have sought to accelerate S&T modernization through the acquisition of foreign, especially Western, technologies and know-how. To date, these efforts have yielded some impressive results, but China still has a long way to progress before achieving parity with the S&T capabilities of most industrialized economies or before reaching its goal of implementing a "national system of innovation."

- The PRC government encourages foreign R&D investment in China, particularly in information technology-related industries, by offering a range of preferential policies that include tax rebates, construction loans, access to modern facilities, and other incentives. Officials also use the lure of China's enormous potential market as leverage to encourage technology transfer and R&D investment from abroad. As a result, most of the

world's leading computer and telecom companies have R&D investments in China.

- In the computer and telecommunications sector, foreign investors have established over 200 R&D centers, programs, or labs in China between 1990 and 2002. The number of newly established centers accelerated in the late 1990s but appears to have declined in the past two years. Chinese press reports estimate the overall number of foreign R&D centers in China to be anywhere between 120 and 400.

- Chinese high-tech enterprises are focusing their efforts on developing new high-tech standards for application in the China market and globally. These efforts have been aided by R&D investments and related systems and standards integration work that took place during the mid- to late-1990s and likely conveyed to Chinese partners—and potential future competitors—a good deal of technological know-how that local enterprises probably would not have had access to otherwise or been able to develop independently.

- On balance, although foreign R&D centers are contributing to China's impressive recent high-tech growth and increasing competitiveness in ICT industries, they are contributing as much or more—under newly consolidated, wholly foreign-owned R&D enterprises—to foreign companies' high-tech development and production capabilities and, thus, to the US economy.

- Efforts are needed to develop a means of collecting data on global R&D activities in order to provide policymakers and business executives with a clearer, more comprehensive, and timely picture of R&D investments abroad. Statistical analysis currently underway in the United States should be coordinated with data collection efforts in other countries, and new statistical methods implemented as soon as possible.

- Information exchanges on high-tech R&D activities should be added to the agenda of meetings held under the US-China S&T Cooperation Agreement. Current Chinese interest in analyzing

and quantifying the growing global R&D trend, along with ongoing cooperation by the US and Chinese National Science Foundations on standardizing collection of statistical data, makes this an opportune time to initiate a bilateral effort to track international R&D investments in China.

- Reforms are needed to the US export control process to account for this new form of international high-tech trade. In the near-term, the US "deemed export" rule should be amended to cover advanced foreign R&D investments and technology transfers outside the United States. Over the longer-term, the US export control system should be reformed to provide a means of monitoring global R&D and other newly emerging international business dynamics. To achieve this objective, senior executive branch officials must make reforming the export control process a top priority and consult with both Congress and industry to develop a workable system.

- Although the United States benefits form a continued net inflow of R&D investment from around the world, US government funding for basic research and education should be increased in order to maintain the US lead in critical high-tech industries and innovation. This is crucial to ensuring the United States remains economically, technologically, and militarily competitive. Additionally, as foreign nationals working in US labs, universities, and high-tech companies become able to find similar work in their own economies due to globalization, the US government must invest more in grade school and secondary education, particularly in basic sciences, mathematics, and engineering, or risk falling behind.