

**CHINA AS AN EMERGING REGIONAL AND
TECHNOLOGY POWER: IMPLICATIONS FOR U.S.
ECONOMIC AND SECURITY INTERESTS**

**HEARING
BEFORE THE
U.S.-CHINA ECONOMIC AND SECURITY
REVIEW COMMISSION
ONE HUNDRED EIGHTH CONGRESS
SECOND SESSION**

FEBRUARY 12-13, 2004

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The Commission was created in October 2000 by the Floyd D. Spence National Defense Authorization Act for 2001 sec. 1238, Public Law 106-398, 114 STAT. 1654A-334 (2000) (codified at 22 U.S.C. sec. 7002 (2001)), as amended, and the "Consolidated Appropriations Resolution of 2003," Public Law 108-7, dated February 20, 2003. Public Law 108-7 changed the Commission's title to U.S.-China Economic and Security Review Commission.

The Commission's full charter is available via the World Wide Web: <http://www.uscc.gov>.
The Commission's Statutory Mandate begins on page 216.

U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION

APRIL 6, 2004

The Honorable TED STEVENS,
President Pro Tempore of the U.S. Senate, Washington, D.C. 20510
The Honorable J. DENNIS HASTERT,
Speaker of the House of Representatives, Washington, D.C. 20515

DEAR SENATOR STEVENS AND SPEAKER HASTERT:

On behalf of the U.S.-China Economic and Security Review Commission, we are pleased to transmit the record of our San Diego, CA field hearing on February 12 and 13, 2004 examining "China as an Emerging Regional and Technological Power: Implications for U.S. Economic and Security Interests." China's technology development, and the pivotal role it plays in the global supply chain for high-tech goods and services, has important implications for U.S. economic and security interests.

The Commission is mandated (P.L. 108-7) to assess the qualitative and quantitative nature of the shift of United States production activities to China, including the relocation of high-technology, manufacturing and research and development facilities. Additionally the Commission is directed to examine China's performance in protecting intellectual property rights, a key area of concern in U.S.-China high-tech trade.

During this field hearing, held on the campus of the University of California, San Diego, the Commission heard testimony from a number of scholars and representatives of California's technology industry. During the discussion, panelists highlighted several important themes:

China's High-Tech Development. The Chinese government has a coordinated, sustainable vision for science and technology development. Many Chinese high-technology developments have been spurred by policies the Chinese government has instituted to accelerate the growth of industries in this sector, which the government believes can help lift the whole economy.

The Chinese government uses foreign investment, technology standards, and industry regulation to catalyze the nation's technological growth. Government procurement remains a lever for technology policy, as do proprietary technology standards. If foreign companies adopt Chinese promulgated standards to get access to the growing Chinese market, they help build economies of scale, which then encourages the growth of exports out of China with these new standards. An example of this is China's new wireless LAN standard. The Chinese government also uses its power over state corporations, and over companies that require licenses to produce or provide services, to organize bargaining cartels with foreign corporations to encourage technology transfers into China.

Several hearing panelists noted the importance of China's high-tech development to U.S. computer and electronics firms who are using it as a production base. One panelist noted that American computer and electronics firms had a rate of return in China of over 20 percent in 2002. Such profits encourage them to go along with Chinese ground rules for technology transfer. China is already the second largest computer manufacturer in the world, and it is expected that higher valued jobs in design, development and engineering will follow manufacturing to China.

China is also making strides in the advanced fields of pharmaceutical and biotechnology production. Products manufactured by China's pharmaceutical companies have to date principally been generic, but foreign investment and the transfers of technology and management systems that accompany this investment are accelerating the growth of a more sophisticated pharmaceutical industry. Foreign manufacturers of pharmaceuticals are beginning to establish R&D facilities in China. The biotech industry in China is also growing. According to one hearing panelist from the U.S. biotech industry, the Chinese government is supporting its development through the annual investment of over \$600 million into universities, research centers, and labs. The Chinese government is encouraging Chinese nationals who have obtained Ph.D.'s in the life sciences field in the United States to return to China and is offering them incentives to do so.

China's Role in the Global Supply Chain. Global production networks dominate China's high-tech export environment. Foreign investment into China has provided capital, management and technology to Chinese production in various technology sectors. Taiwan firms are key investors and intermediaries in China's high-tech production networks.

Maintaining the U.S. Technological Edge. The U.S. role in global high-tech production chains is in the more skill and technology intensive activities, particularly in the R&D stage of production. American-developed technology advances and innovation has generally maintained the United States' status as a global economic leader. The Commission heard testimony from almost every panelist concerning the need for the United States to reinvest in its long-term human capital in order to maintain this technological edge. China currently graduates three times as many engineers as the United States at the bachelor's degree level. There is a great need for the U.S. Government to explore policies aimed at expanding educational opportunities in the mathematics and sciences fields, and for upgrading the U.S. technology infrastructure.

China's Regional Outreach. China has become more receptive toward working in a multilateral format, particularly groupings in which it can exercise a leadership role—such as the Asia Pacific Economic Cooperation (APEC) and the Shanghai Co-operation Organization (SCO). Moreover, China's growing economic influence in the region has enhanced its political leverage as well. This poses a challenge to ensure the United States is not excluded from the Asian region's economic and security forums and that China's role in these forums does not compromise U.S. goals in the region.

China's emergence as a center for high-tech manufacturing and R&D is one of the most significant dynamics of China's economic growth and an area the Commission will continue to follow closely as it poses significant economic and security challenges for the United States.

Yours truly,



Roger W. Robinson, Jr.
Chairman



C. Richard D'Amato
Vice Chairman

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CHINA AS AN EMERGING REGIONAL AND TECHNOLOGY POWER: IMPLICATIONS FOR U.S. ECONOMIC AND SECURITY INTERESTS

THURSDAY, FEBRUARY 12, 2004

U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION
Washington, D.C.

The Commission met in the Great Hall—International House at the University of California at San Diego at 9:00 a.m., Commissioners C. Richard D'Amato and Robert F. Ellsworth, Co-Chairs, presiding.

OPENING REMARKS OF CHAIRMAN ROGER W. ROBINSON, JR.

Chairman ROBINSON. If we might begin our session.

Well, first, good morning. On behalf of the U.S.-China Economic Security Review Commission, I would like to welcome you to our two-day hearing here at the University of California, San Diego.

Our Commission, the U.S.-China Economic and Security Review Commission, was established by the U.S. Congress to investigate the national security implications of our trade and economic relationship with China.

The members of the Commission were appointed by Republican and Democratic leaders of both the U.S. Senate and House of Representatives. In setting out our mandate, the Congress directed us to take a broad view of national security to include an assessment of how our economic relationship with China is impacting U.S. economic and security interests. This is the Commission's second field investigation outside of Washington, D.C. Our first was on January 30th in Columbia, South Carolina, where we examined the impact of trade with China on the U.S. manufacturing base. We heard powerful, personal perspectives on this issue from representatives of South Carolina's industries, workers and communities that are experiencing significant economic dislocations—indeed, a crisis—in the face of China's rapid manufacturing growth, particularly in textiles, apparel and steel. The Commission has traveled to Southern California to hear views on China's capabilities in the production and development of high-technology goods and services, particularly in the areas of biotechnology, nanotechnology, telecommunications, energy, computing and information technology. These industries pose a very different array of economic and security challenges from those highlighted in our South Carolina experience.

The goal of our field investigation is to examine closely the changing trade and investment patterns in the East Asian region due to China's robust economic growth.

Crucial to this issue is China's emergence as a major player in the production of high-tech goods and services and its increasing involvement in advanced research and development in many fields.

Assessing the implications of these developments for both U.S. economic and national security interests is at the heart of the Commission's mandate.

Our two-day hearing in Southern California was organized by my colleague Ambassador Robert Ellsworth, and I would like to thank him on behalf of the Commission for developing such an important and timely event. I would also like to extend the Commission's appreciation to someone we'll hear from very shortly, Dean Cowhey, Professor Shirk and all the others at the Graduate School of International Relations and Pacific Studies who worked so hard to make this on-site visit possible.

Through your good work we have assembled an impressive and distinguished gathering of experts to help facilitate our understanding of an important component of China's economic development and U.S.-China relations. I would also invite the participants in our audience to visit our Web site at www.uscc.gov for more information on the broad-based work of the Commission.

I would now like to turn over the proceedings to the vice chairman of our Commission, Dick D'Amato. And then he, in turn, will be passing the baton to Ambassador Ellsworth, who will be the Co-chair of today's hearing. Thank you.

[The statement follows:]

Opening Statement by Chairman Roger W. Robinson, Jr.

First, good Morning. On behalf of the U.S.-China Economic and Security Review Commission, I would like to welcome you to our two-day hearing here at the University of California, San Diego.

Our Commission was established by the U.S. Congress to investigate the national security implications of our trade and economic relationship with China. The members of the Commission were appointed by the Republican and Democratic leaders of both the U.S. Senate and House of Representatives. In setting out our mandate, the Congress directed us to take a broad view of national security to include an assessment of how our economic relationship with China is impacting U.S. economic and security interests.

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The goal of our field investigation is to examine closely the changing trade and investment patterns in the East Asian region due to China's economic growth. Crucial to this issue is China's emergence as a major player in the production of high-tech goods and services and its increasing involvement in advanced research and development in many fields. Assessing the implications of these developments—for both U.S. economic and national security interests—is at the heart of the Commission's mandate.

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I will now turn over the proceedings to our Vice Chairman, Dick D'Amato, and Ambassador Robert Ellsworth, who will co-chair today's hearing.

OPENING REMARKS OF VICE CHAIRMAN C. RICHARD D'AMATO

Vice Chairman D'AMATO. Thank you, Mr. Chairman.

I join Chairman Robinson in thanking Ambassador Ellsworth for focusing the Commission's attention on the important topic before us and on the unique perspective offered on these issues by the California university community and high-technology community. I would also like to personally commend Dean Peter Cowhey, Professor Susan Shirk and their staff and faculty of the Graduate School of International Relations/Pacific Studies for their outstanding effort in helping develop this two-day event.

As the chairman mentioned, we were recently as a Commission in Columbia, South Carolina, ten days ago or so, investigating the impact of outsourcing and offshoring the U.S. manufacturing base. The story is devastating there, alarming and rapidly escalating in industries like textiles, furniture and steel. Action in the Congress to attempt to manage this is all but inevitable in the near future. But there is more to the offshoring story than manufacturing and basic manufacturing, as the people of California know. In corporations' relentless search for lower costs and favorable quarterly earnings reports, high-tech and I.T. services are moving with increasing rapidity and frequency to India, China and elsewhere.

Some argue that along with these investments in manufacturing capacity and R&D facilities overseas, the United States may be offshoring some of its capacity actually to innovate. The United States has always been a leader in technology development and during difficult economic times pulled itself up through R&D and innovation. Losing our technological edge is likely to have dire consequences for both our economy and national security. We appear to be mortgaging a broad array of assets, pieces of our country's economic future in a historic stampede for short-term gains in corporate profitability and consumer pricing. The mantra or public refrain from the apologists for this spectacle has been that the buggy-whip old manufacturing economy has to yield for the United States to concentrate on the new American services economy and technological innovation.

Now, however, as we know, the service economy is being exported as well, cheered on this week by administration officials, no less than the chairman of the president's council on economic advisors.

More alarming and much more poorly understood is the extent to which and in what ways our high-technology capacity and skills are following the same pattern. That is why we're here today in the beautiful locale of Southern California.

Companies in the past have—have in the past faced ultimatums when entering the China market. As a condition of investment, some U.S. companies have been required implicitly, if not explicitly, to transfer technology and high-tech manufacturing skill to China. Now that China has entered the WTO, such conditionality

is supposed to end. It is, as they say, WTO-illegal. We want to know if, in fact, it has ended.

Moreover, there appear to be other significant factors driving companies to send high-tech services and R&D activities to China, including proximity to mass—critical mass of manufacturing.

For whatever reasons, there is no doubt that the United States and other foreign companies are helping accelerate China's technological advancement.

A key issue that we would like to explore is whether China has been able to successfully leapfrog its technological advancement due to these technology transfers, or is China actually becoming more dependent on foreign technology and, in effect, stifling its technological innovative capacities. There are some people who are making this argument.

Furthermore, technological advancement is fueling China's military modernization. China has focused much of its strategy and doctrine on advancements in informational and electronic warfare, some of it under a fanciful rubric of so-called asymmetrical warfare, assassin's mace weapons and the like, tools and concepts whereby an inferior power might defeat a superior power.

If advancement in this area is in any way being fueled by U.S. technology exchanges with China, we must understand this and fashion appropriate U.S. policies to minimize any security concerns.

In the region as a whole, China is a high-tech manufacturing powerhouse for companies throughout East Asia, particularly Taiwan. We need to understand what this means for Taiwan's security and, more broadly, for U.S. security interests in the region for our alliances and friendships there.

Along with my fellow Commissioners, I look forward to what should be a very insightful two days of discussion. And, again, thank you for your invitation. And I turn the program over to Ambassador Ellsworth. Mr. Ambassador.

[The statement follows:]

Opening Statement by Vice Chairman C. Richard D'Amato

I join Chairman Robinson in thanking Ambassador Ellsworth for focusing the Commission's attention on the important topic before us and on the unique perspective offered on these issues by the California university and high-technology communities. I also would like to personally commend Dean Peter Cowhey, Professor Susan Shirk and the faculty and staff of the Graduate School of International Relations/Pacific Studies for their outstanding effort in developing this two-day event.

As the Chairman mentioned, we were recently in Columbia, South Carolina investigating the impact of outsourcing and offshoring the U.S. manufacturing base. The story is devastating, alarming and rapidly escalating. Action in the Congress to attempt to manage it is all but inevitable. But there is more to the offshoring story than manufacturing, as the people of California well know. In corporations' relentless search for lower costs and favorable quarterly earnings reports, high-tech and IT services are moving with increasing frequency to India, China and elsewhere. Some argue that along with these investments in manufacturing capacity and R&D facilities overseas, the United States may also be offshoring some of its capacity to innovate. The United States has always been a leader in technology development, and during difficult economic times pulled itself up through R&D and innovation. Losing our technological edge is likely to have dire consequences for both our economy and our national security.

We appear to be mortgaging a broad array of assets, pieces of our country's economic future in a historic stampede for short term gains in corporate profitability and consumer prices. The mantra or public refrain from the apologists for this spectacle has been that the buggy-whip old manufacturing economy had to yield for the U.S. to concentrate on the new American services economy and technological inno-

vation. Now we know, however, that the service economy is being exported as well, cheered on this week by Administration officials such as the Chairman of the president's Council of Economic Advisors. More alarming and still poorly understood is the extent to which and in what ways our high technology capacity and skills are following the same pattern. That is why we are here today in the beautiful locale of southern California.

Companies have, in the past, faced ultimatums when entering the China market. As a condition of investment, some U.S. companies have been required (implicitly, if not always explicitly) to transfer technology and high-tech manufacturing skill to China. Now that China has entered the WTO, such conditionality is supposed to end. It is "WTO-illegal", as they say. We want to know if it has, in fact, ended. Moreover, there appear to be other significant factors driving companies to send high-tech services and R&D activities to China, including proximity to a critical mass of manufacturing. For whatever reasons, there is no doubt that U.S. and other foreign companies are helping accelerate China's technological advancement. A key issue needing exploration is whether China has been able to successfully leap frog in its technological advancement due to these technology transfers.

Furthermore, technological advancement is fueling China's military modernization. China has focused much of its strategy and doctrine on advancements in informational and electronic warfare, some of it under a fanciful rubric of so-called "asymmetrical warfare", "assassin's mace" weapons, and other tools and concepts whereby an inferior power might defeat a superior power. If advancement in this area is in any way being fueled by U.S. technology exchanges with China, then we must understand this and fashion appropriate U.S. policies to minimize any security concerns.

In the region as a whole, China is a high-tech manufacturing powerhouse for companies throughout East Asia, particularly Taiwan. We need to understand what this means for Taiwan's security, and for U.S. security interests, that is our alliances and friendships in the region.

Along with my fellow Commissioners, I look forward to what should be an insightful two days of discussion.

OPENING REMARKS OF COMMISSIONER ROBERT F. ELLSWORTH HEARING CO-CHAIR

Co-Chair ELLSWORTH. Thank you, Mr. D'Amato.

As the chairman and vice chairman have explained, our field investigation here in Southern California addresses the issue of China's high-tech development and the implications of that development on regional and U.S.-China bilateral relations.

I thought it would be helpful for the Commission, in fulfilling its Congressional mandate, if it came to California to discuss these issues with those in the California academic and technology communities who have unique perspectives on these important matters. With the help of Dean Peter Cowhey and Professor Susan Shirk we have put together what I believe will be an informative session for the Commission. I thank the University of California, San Diego, and the Graduate School of International Relations/Pacific Studies for their splendid assistance.

The rise of China, in my view, is the economic and geopolitical event of our age. It is bringing two centuries of global domination by Europe and subsequently America to an end. World-transforming change has begun. Measured by purchasing-power parity, China is already the second-largest economy in the world, second only to the United States, and the world's largest population by far. Its potential for the future is huge.

For American high-tech companies, China presents both a challenge and an opportunity. While barriers to trade and investment have come down following China's accession to the World Trade Organization, these firms still face an array of obstacles in China, from remaining tariffs and nontariff barriers, to China's weak protection for intellectual property. Moreover, down the road, U.S. and

other technology firms likely will face increasing competition from Chinese domestic firms whose technological advancement is on the fast track. China's cell phone consumption is the highest in the world, and it's a major market for semiconductors. It has become a growing center for high-tech manufacturing and in some cases research and development for global technology firms.

As a result, China plays the role of lucrative market to high-tech companies, as well as a cost-effective production and research base. The Commission seeks to understand these dynamics, particularly the rapidity with which China is developing its high-tech capacities, as they pose issues for both our economic competitiveness as well as national security concerns where certain sensitive or military-related technologies may be involved. The quality of China's military modernization program is impressive, albeit the quantities are small. Most of China's effective military power threatens Taiwan. Precision-guided missiles, strike aircraft, fast-attack submarines, nuclear and space capabilities—all are being modernized.

A second major issue that will be addressed during our field investigation is how these dynamics are affecting trade and investment trends for the Asian region as a whole. The reexport of high-tech manufacturers through China has changed the investment and trade flows of the region. China's major role in the global supply chain for technology goods and its corresponding economic clout is impacting the political landscape of Asia. The Commission needs to assess these trends and their implications for U.S. interests in the Asia region. Now, let me just briefly forecast the flow of events today and tomorrow. Following an introduction by Dean Cowhey on China as an Emerging High-Tech Giant, the morning portion of this hearing will consist of two panels.

The first will explore the current trends and future challenges in China's economy. Professor Barry Naughton of UCSD, Professor Scott Rozelle of UC, Davis, and Professor K.C. Fung of UC, Santa Cruz, will speak about the economic trends in China's rural areas and the thriving economy of its foreign-invested eastern coast. Second panel will examine China's role in regional production and investment networks. Professors Gordon Hanson, Stephan Haggard and Richard Feinberg, all from UCSD, will testify. During the second portion of the day, the Commissioners will have an opportunity to dialogue with California's high-tech industry leaders. The afternoon will begin with a panel focusing on the biotechnology industry. Dr. Lee Zhong, president of NatureGen and Elene Pharmaceuticals; Mr. Greg Lucier, president and CEO of Invitrogen Corporation; Mr. Joseph Panetta, president and CEO of BIOCOM; and Dr. Kerry Dance, managing partner of Hamilton Apex Technology Ventures, LP, will join the Commission.

The final two panels will cover a range of other key high-tech industries. We will have a panel with William Bold, vice president of government affairs for QUALCOMM; Jason Dedrick of the Center for Research on Information Technology and Organization, UC, Irvine; and Dr. Francine Berman, director of the Supercomputer Center, UCSD.

They will testify from the perspectives of the telecommunications, electronics manufacturing and supercomputing industry, respectively. During the last panel of the day, the Commissioners

will hear from Dr. Michael May of the Center for International Security and Arms Control, Stanford University, who will focus on the energy industry.

Our field investigation will conclude tomorrow with a round-table discussion on China's role in Asia.

Professors Susan Shirk and Ellis Krauss of UCSD and Professor David Lampton of the Johns Hopkins School of Advanced International Studies will participate.

Again, I want to thank UCSD and especially the Graduate School for their help in putting together our two-day event and look forward to the testimony.

And our chairman, Roger Robinson, will have the honor of introducing Peter Cowhey.

**Opening Statement by Commissioner Robert F. Ellsworth
Hearing Co-Chair**

As the Chairman and Vice-Chairman have explained, our field investigation in Southern California addresses the issue of China's high-tech development and the regional and U.S.-China bilateral implications. I thought it would be helpful for the Commission in fulfilling its Congressional mandate if it came out West to dialogue on this issue with those in the California academic and technology communities who have unique perspectives on these important matters. With the help of Dean Peter Cowhey and Professor Susan Shirk, we have put together what I believe will be an informative session for the Commission. I thank UCSD and the Graduate School of International Relations/Pacific Studies for their first-rate assistance.

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Following an introduction by Dean Cowhey on "China as an Emerging High Tech Giant," the morning portion of this hearing will consist of two panels. The first will explore the current trends and future challenges in China's economy. Professor Barry Naughton of UCSD, Professor Scott Rozelle of UC Davis, and Professor K.C. Fung of UC Santa Cruz will speak about the economic trends in China's rural areas and the thriving economy of its foreign invested eastern coast.

The second panel will examine China's role in regional production and investment networks. Professors Gordon Hanson, Stephen Haggard, and Richard Feinberg, all from UCSD, will testify.

During the second portion of the day, the Commissioners will have an opportunity to dialogue with California's high-tech industry leaders. The afternoon will begin with a panel focusing on the biotechnology industry. Dr. Lee Zhong, President of NatureGen and Elene Pharmaceuticals, Mr. Greg Lucier, President and CEO of Invitrogen Corp., Mr. Joseph Panetta, President and CEO of BIOCOM, and Dr. Kerry Dance, Managing Partner of Hamilton Apex Technology Ventures, LP will join the Commission.

The final two panels will cover a range of other key high-tech industries. We will have a panel with William Bold, Vice President of Government Affairs for Qualcomm, Jason Dedrick of the Center for Research on Information Technology and Organization (UC, Irvine), and Dr. Francine Berman, Director of the Supercomputer Center (UCSD). They will testify from the perspectives of the telecommunications, electronics manufacturing and supercomputing industry, respectively. During the last panel of the day the Commissioners will hear from Dr. Michael May of the Center for International Security and Arms Control (Stanford University) who will focus on the energy industry.

Our field investigation will conclude tomorrow with a roundtable discussion on China's role in Asia. Professors Susan Shirk and Ellis Krauss of UCSD and Professor David Lampton of the Johns Hopkins School of Advanced International Studies will participate.

Again I thank UCSD and the Graduate School for their help in putting together our two-day event, and look forward to the testimony.

Chairman ROBINSON. Thank you, Ambassador Ellsworth. Indeed it is an honor. We're beginning with remarks by Dean Cowhey, for which we're grateful, that go under the title "China as an Emerging High-Tech Giant." As all of those assembled here know, Dean Cowhey is dean of the Graduate School of International Relations and Pacific Studies, as well as director of the Institute on Global Conflict and Cooperation. He holds the QUALCOMM-endowed chair in communications and technology policy.

Dean Cowhey is an internationally recognized expert in telecommunications and information policy and markets, who's a leader in building cooperative international arrangements for the management of security and economic issues. He served in the Clinton Administration for some three years as head of the International Policy and Regulation Division of the Federal Communication Commission, as well as an advisor to the U.S. trade representative. He's widely credited as having been the moving force behind the successful completion of a global trade agreement in 1987 at the World Trade Organization, to open up competition in basic telecommunications markets. Dean Cowhey remains dedicated to hands-on service and advocacy in creating the next networking and information technology revolution. He not only serves on the advisory boards of the United Nations Development Program and U.S. Agency for International Development, but has been an advisor to over 50 countries seeking to reform their communications markets, as well as corporate giants, such as QUALCOMM, AT&T and others. He currently serves as chairman of the board of Digital Partners, a global nonprofit organization that works on harnessing digital technology for economic and social development. Now, I could go on, believe me—it's a very distinguished resume—but I will stop here and say that one thing is clear, that Dean Cowhey is a visionary, a scholar and one who has been a leading light in the very fields that we'll be discussing today.

We're most grateful to be here, again, and thanks again to Dean Cowhey and Professor Shirk for all they've done to make this event possible. And with that, I would be very pleased to turn the floor to you, sir.

INTRODUCTION: CHINA AS AN EMERGING HIGH TECH GIANT

**STATEMENT OF DEAN PETER COWHEY
GRADUATE SCHOOL OF INTERNATIONAL RELATIONS AND
PACIFIC STUDIES
UNIVERSITY OF CALIFORNIA, SAN DIEGO**

Dr. COWHEY. Thank you very much for those kind remarks, Chairman Robinson. And as the Dean of the Graduate School of International Relations and Pacific Studies here at the University of California, San Diego, I would like to welcome you to this university.

We knew that you were coming and this would be an important occasion, so we decided to put up a new hall in your honor. This is called the Great Hall, forms a symbol that may indicate the Pacific orientation of meeting places here in California.

As the largest school in the United States that's devoted to training professionals for the Pacific region, we believe deeply in the value of conversations and public debate about the key relationships in the region. And there's certainly no relationship that is more important to the future of the Pacific than the relationship between the United States and China. And, indeed, in the long haul of the 21st century, there may be no single bilateral relationship in the world that is more important to the world.

We've worked hard with the staff of the Commission to make sure that you have an opportunity to hear insightful voices from both the West Coast technology community and from our community of experts on China and Asia. Much of the expertise in the United States on China is located here on the West Coast. But even in this age of the Internet, geography creates a barrier to policy discussions between the West and the East Coast. So today and tomorrow that barrier's being dissolved by your decision to come here. For that, we are thankful. And I'm confident that both the people who are presenting to you and I hope those of you on the Commission will learn much from this discussion. I also want to express our special thanks to Ambassador Ellsworth and Vice Chairman of the Commission D'Amato who worked closely with us here at the Graduate School in forging this particular program and giving us guidance on how we can be helpful to you.

Now, my job today is to go beyond offering greetings, which is usually what they restrict deans to doing, to trying to provide an overview of a larger context about the issues that your Commission is grappling with. I want to begin by acknowledging that you have a very serious challenge to protect the economic and security safeguards of the U.S. and offer candid advice to Congress about that. There are, no doubt, many hard decisions that have to be made about dealing with specific problems. But I would like to begin by stepping back from the specifics of both the bilateral relationship and the immediate charge of the Commission, to looking at the larger context in which the Commission and our bilateral relationship exists, namely, by looking at issues of the future of the Pacific

and also of science and technology relations in the Pacific. And then I will close my remarks by looking more specifically at the possibility of China becoming, if you would, a coequal with the U.S. and technology leadership. Is that a credible worry, or is that something that is perhaps overblown? I believe that any history textbook that's used in the late 21st century will surely dwell on two transformations in the Pacific since 1945: First, the Pacific, which, for simplicity's sake, I'll simply define as the Americas and Asia, has emerged as the dominant pivot of the world economy in the second half of the 20th century and certainly the beginning of the 21st.

It is the center of gross domestic product. It is the center of technology innovation and production. It is the center of many of the largest military challenges in the world. It is the center, in fact, of many of the largest global environmental challenges.

Now, Asia has been more important than Latin America in driving this shift in the world economy from the Atlantic to the Pacific, but countries like Brazil and Mexico will surely play a larger role in the next 20 years in this economic and technological transformation of Pacific leadership.

Now, the second thing that has occurred is that Asia has emerged, or maybe in a great historical sense reemerged as a major center for technology production and innovation. Your Commission is dealing with the U.S.-China relationship. But, in fact, this is playing out a cycle that began almost 30 years ago.

Japan's emergence as a major economic power in the 1970s was fueled by evermore sophisticated technological offerings, and it was simply the first round of change in Asia. Korea soon became a technology power that rivals France, and Taiwan is the center of some of the most advanced technology manufacturing systems in the world.

Along with that we have the specialized, if you would, boutique design and production centers tied to multinational corporations around Singapore and Malaysia.

And, finally, in the latest round, China and India have stepped forward with all their scientific expertise and huge population resources to complete this innovation cycle across Asia. Now, it's important that we keep a steady eye on this historic transformation in order to put the U.S.-China relationship into perspective. I want to make two claims this morning. The first is fairly sweeping. The building of a Pacific community is one of the paramount foreign policy challenges for the U.S. in this century, and science and technology policy is going to be a large part of that challenge. And the second and somewhat narrower claim is that any policy for science and technology relations between the U.S. and China must situate that bilateral relationship and its policies within an understanding of the larger regional innovation and production cycle that has emerged in the Pacific.

I once learned from a great history professor that the bigger the claim, the briefer should be the justification, because there's always going to be a million details wrong about the big proposition, but the big core insight should be relatively simple. So I'm going to offer you my two-minute guide to each of these broad-sweeping claims.

First, why is building a Pacific community a paramount challenge? Well, the same 21st century textbook will note that the first half of the 20th century had two world wars and a great depression. As the center of the world's military, political, economic and technological power of that era, namely, the Atlantic region ranging from here in the California through the Euros, struggled to find a modus vivendi to manage rapid changes in national competitive positions and national strategies.

It was only after that terrible turmoil in the second half of the 20th century that we emerged by the very rough standards of justice of history in an era of major power peace, despite the Cold War, and an unprecedented sustained prosperity economically and technological innovation in the core of the world economy. And at the same time, Europe emerged as a thoroughly Democratic society, and we built a transatlantic web of diplomatic military and economic institutions that truly created an Atlantic community.

Paris and Washington may anger each other, but this is fundamentally a family feud, not a warfare between clans.

By most metrics, the Pacific has now superseded the Atlantic as the center for the world's economic, technological and military power.

The question that is starkly facing American foreign policy is simple. Will we duplicate the record of the Atlantic in the 20th century, requiring 50 years of woe before getting it right, or can we find a way of producing a Pacific community consistent with democracy, prosperity, innovation, sustainable environmental relations more quickly and less painfully? Now, I have to tell you that I'm no advocate of Wizard of Oz diplomacy, you know, click your heels three times and you'll get to exactly where you want in the world, whether it be Kansas, Ambassador Ellsworth, or California. But for the sake of our children and our grandchildren, we shouldn't lose sight of this bigger picture. In an era surging technological innovation and globalization, science and technology policy is going to be a large part of this Pacific community story and simply because those are the tools for building faster economic growth and giving us the tools for attacking our common problems, such as the management of disease.

Market forces and sound policy can let the U.S. lead this technological revolution on a continuing basis. But we can't lead by sustaining our leadership through restricting the sharing of technology with all those who are willing to play by sensible global rules.

And moreover, in the last part—in this coming century, even more so than the last century, as I think you'll hear in the testimony, science is going to be a truly unified global effort. And many of the ways that we thought about national rivalries and technology don't quite play out the same way in the future as they did in the past.

Now, my second claim is simply that we shouldn't ignore the regional production and innovation cycle and technology in the Pacific as we deal with the bilateral relationship.

I'll remind you that in the early 1990s there was a consensus emerging in the business press and in many government circles that the U.S. was about to be eclipsed by Japan in communications and information technology. But suddenly overnight that changed.

Why did that happen? Well, probably the two most important factors shifting the balance of power between the U.S. and Japan involved the creation of a Pacific supply chain for production and innovation and the role of competition and empowering innovation.

I want to talk about both of those because they somewhat recast some of the discussions that perhaps you often hear about the U.S.-China relationships.

You recall that Japan seemed to be surpassing the U.S. because of its clever design of vertically integrated production and marketing operations, which they supplemented by strategic protection of the home market. And over time, slowly Japan was seeming to grind down the American technology leadership. Now, U.S. industry responded by getting the U.S. Government to push harder to open the Japanese market, something that I thoroughly supported at the time. And that certainly helped, but it did not suffice.

The U.S. success in responding to Japan came because industry itself reinvented its systems of production and innovation. And in particular, the U.S. invented a whole new way of building an international network to coordinate specialized design and production partners in Southeast Asia, Taiwan, Korea on the one hand and Mexico on the other.

And it was by utilizing the expertise, initiative and money of its foreign partners in a sophisticated information and incentive network that U.S. firms were able to trump their Japanese counterparts.

Japan moved to production overseas, but it was essentially a Japan-incorporated affair, moving their own firms to those places and running the same hierarchical Japanese system. American firms learned how to coinvent, coproduce and coinvest. And in that you found a major shift in competitive advantage. Now, that complex division of labor led by U.S. production chains involving Taiwan and Southeast Asia has now spread to an even more complicated chain involving China, Southeast Asia and India.

And this is almost being redefined on a monthly basis. My point is that this is not an alternative to U.S. production and invention. It is a complement and a coinventor with U.S. leadership.

Now, a second key to the American resurgence in the early 1990s was simply the competition-fueled innovation in the United States in unexpected ways. Both the Internet and the World Wide Web figured in none of the technology-planning documents that could be found in European and Japanese firms. And equally importantly, it didn't appear in the planning documents of AT&T. All right. What happened in the United States was that because of innovative capital markets, a vast investment in having competitive, decentralized small firms through our science and technology and internal competition policies, we got a bunch of upstarts who didn't believe in the standard business models and didn't believe in the standard technology plans of the giants. And if you want to rewrite the history of communications and information technology in the '90s, ask companies like Siemens, Fujitsu and Alcatel exactly how much trouble companies like Cisco, QUALCOMM and Dell created for them. All right.

Those companies, in turn, could not have succeeded in their strategy without the coinvention in innovation cycle that they created in the Pacific.

Now, this Commission has an important job in pointing out to areas where the U.S. policy can continue to accelerate our innovation and leadership to make sure that we remain the anchor of the world technology community. And you certainly should address specific issues about trade and security policy that are created by interdependence, but we must remember this larger cycle as we evaluate our long-term strategy. So let me turn to the last part of my remarks, which is really focusing on whether China can compete seriously with the U.S. for technological leadership.

In addressing this, I am going to fall back on my narrow area of expertise about communications and information technology simply because any attempt to assess comparative national metrics is tricky enough in itself, and at least here I know where my worst mistakes could be made. Let me start by stipulating something, which is that what I want to do here is simply ask, could China's use of the Internet as an engine to fuel technology innovation propel it to a deeper and broader technology parity? The Internet represents not just the Internet services themselves, but also a new communications infrastructure, supporting hardware and software. So it's an engine for technological innovation, not just a set of services to use as we surf on the Web.

And I would like to further stipulate that we should not be surprised if a large, low-income country with a substantial pool of scientists and engineers won't make some significant advances in the commercial marketplace for technology. It almost has to happen.

The real question is whether selective successes are translated into a general upgrading of China's technology position, and, if so, how fast and how deeply?

And in this I would like to especially focus on Chinese government policy. Now, as I look at this, let me add a final stipulation. What we have learned from the Asian technology miracle of the last 30 years is that government intervention in marketplaces can accelerate technological upgrading of economies.

There is no doubt that that's a central lesson from both Japan and Korea, but those same casebooks would tell us that government policy doesn't always get it right. The same Japanese policies that propelled Japan to challenge the U.S. in communications and information technology until the early 1990s also dealt a serious blow to Japanese competitiveness by not knowing how to adapt quickly enough to the demands of the Internet.

The stakeholders, if you would, in the old Japanese industrial policies wouldn't consent to letting the market shift in response to the Internet innovation.

So government policy both has its strengths and its weaknesses in this story. Now, to explore the story of China's ability to challenge the U.S., I'm going to begin briefly skimming over a few of the factors that suggest that it's going to be hard for China to move to serious competitive parity in technology with the U.S.

And then I'm going to turn and look at how Chinese government policy might leverage some strengths of China into parity. So it's for skeptics and then people who believe that there is a serious

challenge, each being examined. The skeptics' case, which I will, for the sake of time, only move through briefly, begins fundamentally with the fact that the gap between the United States and China in technological strength is enormous. And this is reinforced by huge differences in the basic infrastructure of the two economies.

I have presented the Commission with a large number of tables with data to look at this issue selectively. And Tables 1 through 9 might be thought of as the case of skeptics being illustrated by data about the Chinese challenge. Rather than review those tables in detail, let me instead point to a few of the things that leap out from those tables. The first is simply that the research and development effort between the United States and China remains enormously large. Gross domestic product advocated to R&D in China is about 1 percent. In the U.S. it's 2.7 percent in a much larger economy.

More deeply, if you take a look at the same technology products, let's say electronics, between the United States and China there is an enormous difference in the comparative value added of the two.

In the United States the value added of those products created by R&D is about 22 percent. In China, it's about 5 percent. You may call them both computational products, but one is the product of an intensive R&D; the other is essentially a commodity product still. Now, a second factor that would leap to mind if you looked at the infrastructure for innovation are fundamentals like the communications infrastructure. There are tables that I've presented to you showing you that the bandwidth for high-speed data communications, which is a key to innovation in the next 25 years, is hugely different between the United States and China, and it creates enormous indirect competitive advantages for the United States. Similarly, if you do measures of the stock of intellectual property or the ability to create it in the short term, there still remains overwhelming gaps. The OECD average of patents per 1 million people is close to 150, and, of course, the U.S. far exceeds that. The level in China is 5. All right.

So there are enormous differences in the starting point of the two countries. And those differences, despite rapid Chinese growth, suggest a substantial lead for the United States for the foreseeable future.

Now, that is what a skeptic would start by saying about the Chinese claim to hoping for parity. But let me turn to a second factor about the case for parity and Chinese leadership. Any case that China is going to move up against the United States depends on assuming that the Chinese government's intervention in its economy will work successfully for achieving parity. That is, it will have successful R&D technology and industrial policies. There is no doubt, I think, that the Chinese interventions will in many ways be fruitful, just as those in Japan and Korea were fruitful. The point I simply want to point you to is remember the other side of the Japanese and Korean record when government policy went wrong. This is not surprising. It's not particularly unique to Asia. In the United States Professors Linda Cohen and Roger Noll have written a magnificent study called "The Technology Pork Barrel."

And the point of the study is that U.S. research and development policy at the government level is certainly the best-disciplined,

best-focused and really most quality-oriented R&D program in the world. But it is also characterized by huge amounts of expenditures that look a lot like roads and harbors and ports. One of the reasons why the war on cancer defined the biotechnology research of agenda for years was why? Because you could fight cancer in every congressional district in the United States. And often expenditures on cancer exceeded other bio priorities simply because of that. Now, I won't go through the formal litany of analysis, but let me give you a flavor of one effect of these sorts of political dynamics in China.

Any review of the hardware and software industry for communications and information technology in China in comparison to India leads to a single conclusion. China has specialized in hardware; India has specialized in software. But we know one of the reasons why that has occurred in China. And the reason is, is that it is politically popular to point to the creation of larger hardware sales and exports as a measure of success of Chinese communist policies. Yet, in fact, the real growth factor in this industry by any metric we have outside of China is really in the software side of the industry.

So China has made a bet in its early technology policy that is not an optimal bet. Now, it doesn't prove that China won't correct that bet later on, but we should be aware that government policy has a two-sided edge, both good and bad.

Nonetheless, I am not trying to gainsay the fact that China has some strategic advantages that could propel it forward.

Again, I've presented a number of tables in my background testimony that I don't intend to go into at great length, but it's surely true in the information and communications industry that we can't ignore a compound annual growth rate of 27 percent in the Chinese market. China is now the third largest communications network service market measured by the number of users, and it has the third largest personal computer base in the world. Moreover, about 19 percent of its exports can now be classified as high tech in manufacturing, and they have been upgrading the manufacturing output of China towards a technology base steadily over the last eight years. Just as significantly I would draw your attention that the high-tech exports of China and Hong Kong together, which ought to be thought of as a single unit for this purpose, now exceed \$100 billion a year. That's just a little behind Japanese high-tech export levels. That's a dramatic increase.

Let me turn to the last point I want to make before turning to the point of Chinese government policy, which is that foreign research in China has grown. I present evidence in this in my testimony. But it's unclear yet whether this is fundamentally basic research or it's applied product engineering.

How can government policy in China leverage the last great leap forward? What you need to be paying attention to about the misuse of government power. Let me just mention four points. First, the Chinese government has used government procurement as a strong leverage point for promoting Chinese firms and technology. Government procurement remains a lever for technology policy.

Two, China's employed proprietary technology standards to shift the terms of competition in favor of Chinese technology. Now, the creation of proprietary national standards are not new or unique

to China. The U.S. television industry has used this ploy many years and many times.

But what is important in China is that China is first developing those standards giving the bait to Chinese—to foreign producers that the large internal Chinese market justifies a proprietary standard. And then once they get economies of scale, they're encouraging the growth of exports out of China with those new standards. It's a clever positioning off of the Chinese market.

Finally, the Chinese government is using its powers over state corporations, in particular, and over companies that require licenses to produce or provide services to organized bargaining cartels with foreign suppliers, whether on the terms of royalties or on the terms of technology licensing. This is not a direct government mandate. You can't find it written down in the formal regulation. You simply give guidance through the licensing process or through the budget review of the state enterprises in order to drive the market.

Much as we had to unravel the indirect controls of the Japanese government over the Japanese economy, we have to continue to unravel these Chinese controls.

As we deal with these specific issues and intentions, we will at times run into conflict; but in the long term, our welfare as a society fueled by technological innovation and our prosperity as a competitor in the world as a producer of high-tech goods and services depends on keeping the Pacific innovation community alive, recognizing that China is going to become a central part of that community and figuring out how we can manage this relationship so that for all of our sakes, both here and in China, in the long term we can prosper even as we deal with the challenges.

Thank you for being here today.

Chairman ROBINSON. Well, thank you for that extraordinary tour de force to serve as a framework for our proceedings today. I was impressed with so much of what you've said, and certainly that—the comment concerning India on the software side, China on the hardware side is one of the great markers, if you will, for the 21st century as we look at the emerging giants, so to speak.

And underpinning of so much of what you've said and so much of what our Commission tries to grapple with on a day-to-day basis in exploring our rather broad-based mandate is, of course, the dynamic that is constantly underpinning these developments between sustainable economic and technological dynamism and innovation and the need for strength and political pluralism and individual liberties, which gets to the heart of will the Internet be that engine—

Dr. COWHEY. Right.

Chairman ROBINSON. Thank you for your presentation.

And I would like to turn over the morning's proceedings to the vice chairman of our Commission, but also the cochairman of this hearing, Dick D'Amato.

Vice Chairman D'AMATO. Thank you, Mr. Chairman.

And I also would like to join the Chairman in thanking you, Dr. Cowhey, for an unusually thoughtful and excellent presentation. It provides a framework for questions that we should be including in our inquiry. I think that the appropriate perspective for us is to

look at Pacific as a region. And we sometimes get diverted to some of the more specific concerns we have about the China relationship, such as the chairman mentioned in terms of the Internet. We had a long investigation on the Internet issue in association with the SARS question. And any kind of issue dealing with innovation on the Internet also needs to consider how one can really be a competitive innovative power at the same time you control those forces of innovation. It just doesn't seem, in the long run, to work very effectively.

Actually, we have been successful in getting a recommendation through the Congress in this latest appropriations bill to do a pilot program in terms of actually breaking through that Internet firewall.

We know that there are some technology companies in the United States that can do that, and we're going to give them some money to show us how they can continue to do that and broaden the access of the average Chinese computer user to the World Wide Web without censorship. We think that will help be very valuable.

I also would like to commend you in terms of looking at the question of the role of government in all of this. Of course, this Commission is a Government Commission. We're created by the Congress to provide the kind of practical recommendations and insights for action by the Congress in terms of enhancing American interests in the region.

And so we're going to be trying to take away from this hearing and your remarks some ideas that we can give to the Congress in terms of actions that they might consider in the upcoming year.

I might mention that we usually have members of Congress or the Senate testify before us. We did invite Congressman Duncan Hunter, Susan Davis, Senators Feinstein and Boxer to the hearing. They had something better to do on the other side of the country. They are in session in Washington were not able to come today. We do have some staff members from those offices here today. We welcome them, and we'll be back to their members with our hearing record.

So we'll do a hearing record. All these statements will be included in the record. And we will publish that within two weeks and distribute that widely. Mr. Mulloy, do you have a question?

Commissioner MULLOY. Dr. Cowhey, thank you. Your presentation was very helpful. I want to look at this in the broad context in which you've given it. My father served in World War I, so I do have that broad sweep from listening to him and then seeing what happened after World War II. And we built multilateral institutions to help us assure that those types of events would not come on us again, at least try to manage them. My sense is that the United States, through actions like creation of the WTO, China's entry into the WTO and other things, we've put ourselves into a globalized economy. I don't think we fully understood the historical forces that we were setting loose by doing this. Senator Schumer and Paul Craig Roberts, who was an assistant secretary of the treasury under Ronald Reagan, a former free-trader, who are saying that what we've got here now is not Ricardo-type trade based on comparative advantage, because now the factors of production, technology and the capital are loose worldwide. And people who

had the technology and capital who could monopolize are now not going to be doing that.

Now, if you're looking at the United States, we have a \$500 billion current account deficit, \$125 billion trade deficit with China. If you're watching the presidential campaigns, you'll see that out there in the heartland there's a lot of hurt with loss of jobs and a sense of a downgrading of the standard of living for a lot of people in the country.

So I think it's interesting that these are the political realities that we've got to contend with as we're talking about these larger trends that you put before us.

Specifically, you have a chance to tell the President, what are the three or four things that we ought to be doing to prepare our society to compete—to compete in this globalized economy? I think that's what we need to be helping think about and particularly with China. What would be the three or four things that you say, okay, bang, bang, bang. These are the things that are going to correct some of these trends, which are very, very politically explosive right now.

Dr. COWHEY. Well, that's a very thoughtful and big question, and I don't want to do my professor's routine where I could give you a 20-week lecture about it. But let me instead mention bang, bang, bang, a few things that I think are important.

The first is that there is absolutely a need to reinvest at the highest possible levels in our long-term human, you know, capital investment for advanced leadership in the people who make technology work, and along with it the infrastructure.

One of the things that you observe in our R&D budgets in the United States is fundamentally that we aren't investing in a lot of the infrastructure that we alone can afford and creates an enormous leverage in the United States. A second point, because that may sound like self-pleading from a research university professor, is that I think that we have to take seriously the question of the adjustment of labor markets because it's going to be more volatile than in the past.

It used to be that we expected that industries that were under-challenged in foreign trade would decline on some steady metric. And we'd protect them a little bit, we'd subsidize them a little bit, but they would be declining. And the time would sort of allow for the adjustment.

But this world that we're living in with deeper liberalization and faster changes in competitive advantages is going to displace a lot more workers and families a lot faster. I'm going to offer a thought that is not, I would say, commonly expressed, but let me just put it boldly. There is an enormous scholarly literature on trade that says that the cost of protecting jobs is very, very high. It's in the millions of dollars per job typically. Yet how do we compensate unemployed workers? We usually say, well, we'll give you a retraining program. We'll give you unemployment benefits for a number of weeks.

How much do we spend on that? Do we spend 100,000, 200,000? I don't know what the exact number is on average.

What if we just simply said as a society that for every trade-related displaced job in the long term—and there are ways you can

define that—that we will simply make a payment of an annuity of \$1 million to the displaced worker? Why not say that we recognize that there is a cost for workers of the adjustment of the economy and invest seriously in workers in a social bargain about that? I don't know if that number is right. What I'm saying to you is that it's—we need a different social contract than simply worker re-training and unemployment. And the third thing I would say to you is that fundamentally, the problems that we are dealing with is going to require a larger growth of institutions for the Pacific. The Atlantic success of the second half of the 20th century didn't come just because of NATO.

It came because there was NATO, there was the European union, there was the World Bank and the Marshall Plan. All those things came together—the Fulbright Program.

We have to bring all those things together so that there are some shared problems that everybody is working on that leads us to treat the adjustment problem not just as a U.S. problem, but a shared problem of all the industrial players. And I think that that's going to be a key challenge for diplomacy.

Vice Chairman D'AMATO. Thank you very much, Dean Cowhey.

We'll go ahead now and move to our first panel. We have three members of the intellectual establishment, university community, with us: Dr. Barry Naughton, Dr. Scott Rozelle and Dr. K.C. Fung.

Let me just lay out for you our ground rules and how we'll organize ourselves. We would like each of you—we have your testimony, and we will include your testimony in full in our hearing record. We would like to ask you to give us an oral presentation as long as you like, up to about eight minutes, if you would. And we'll have each of you give that in series. So we'll have three eight-minute presentations, and then I'll open it up to Commissioners, who will then have five minutes for your questions and answers for the panel.

Why don't we start from right to left. Would you like to start, Dr. Naughton? Thank you. Go ahead.

PANEL I: THE CHINESE ECONOMY: CURRENT TRENDS AND FUTURE CHALLENGES

**STATEMENT OF BARRY NAUGHTON, Ph.D.
PROFESSOR OF ECONOMICS
GRADUATE SCHOOL OF INTERNATIONAL RELATIONS AND
PACIFIC STUDIES
UNIVERSITY OF CALIFORNIA, SAN DIEGO**

Dr. NAUGHTON. Thanks very much. It's a tremendous honor for us to host you here at UCSD. There's some familiar faces among you and some new friends, and it's a great honor for us to be here and have you here, as well. So thank you very much for giving us this opportunity to testify.

I would like to take a look at—a little bit more specifically at the Chinese economy. Chinese economy is exploding. At a GDP growth of 9 percent last year despite the SARS epidemic, it's the fastest-growing economy in the world. And in the high-tech sector—let me just put one number on the table. Exports of computers and components from China last year increased 104 percent in a single year. It's astonishing, the magnitude of change that's going on in China.

What I would like to do in my eight minutes is try and link some of these processes in China to the structure of the Chinese economy and then talk about a few of the implications for United States' interests.

But let me say at the outset that I follow very much in the spirit and analytic framework of Dean Cowhey's remarks.

Although China's rapid growth certainly poses some competitive and rivalry factors for the United States, one of the themes that will run through my remarks is the surprisingly strong partnerships that link U.S. firms, Taiwan firms and Chinese firms.

If we want to talk about high-tech development in China, we have to think about Taiwan and the United States because these are the two key actors in making the dramatic changes that we're talking about happen. Until very, very recently it made sense to think of China as two separate economies: a domestic economy that was fairly protected, where the government tried to shape economic outcomes, and an external economy that was extremely open, dominated by foreign investors, especially Hong Kong, Taiwan and U.S. investors and where goods moved in and out of the economy quite freely and without much government intervention at all. These distinctions are now dissolving. This dualistic economy is changing in fundamental ways, and the two spheres of the economy are starting to interpenetrate.

Domestically, the state has retreated in very important ways, both from industrial policy and from direct state ownership. The number of people working for state-owned firms in China has reduced 45 percent in the last five years.

The state sector is half the size it used to be even as the economy as a whole has increased by about 50 percent during the same period. Government continues to try and shape outcomes, but it does so with a much more realistic sense of what it can achieve. Why does it have this more realistic sense? Because when you look back on the record of the more intrusive Chinese industrial policy over the last 15 years, you can go back to the programmatic documents that the Chinese government produced, rather like what Dean Cowhey was saying in terms of planning in major corporations in the U.S. before the Internet.

And you can see that their targets, their selected firms, their national champions—not one of them is an important success story that's a significant rival to us today. There are other Chinese firms that are significant on the horizon, important and potentially might pose competitive challenges, but those are not the ones that the Chinese government was nurturing and building. So recognizing that, the Chinese government has backed down significantly. One last number in terms of the domestic side. China trades both in this externally oriented network and in trade for goods that come into the domestic marketplace directly. Chinese call that ordinary trade imports. Those ordinary trade imports have increased 30 percent per year since 1997. Relative to Chinese GDP, it imports into its own domestic market three times what it did six years ago. So WTO compliance is uneven. It's raggedy. There are some real problems. But taking a step back, the long-term bottom line is that economy is considerably more open than it used to be. When we look at the external piece of the economy, what we see is a trade

that is dominated by global production networks. Global production networks are led in most cases that have relevance to our economy by U.S. firms. But there's also a crucial intermediary, and that crucial intermediary is Taiwan firms. If you look at the personal computer industry, for instance, almost all of the new output coming out of China, the new exports, are produced through production chains where Taiwan-invested firms play a key role, but the overall stream of production is organized, is architected, in a way, by U.S. firms. Let me take an example. The hard disk drive industry. Here's a classic industry that fits into the pattern that Dean Cowhey was talking about.

20 years ago Japanese controlled the most sophisticated technology. Today U.S. firms dominate the industry.

Seagate, a U.S. firm, produces hard disk drives in Wuxi, in China. It exported \$1.2 billion worth of hard disk drives out of China. But it also imported from its neighbors in the rest of East Asia almost the exact same number, \$1.2 billion worth of components that were assembled into China.

The value added in China was less than 10 percent of the exported product. The value added in the United States that accrued to U.S. designers and engineers, we don't know the exact numbers, but almost certainly more than 50 percent of that \$1.2 billion.

The fact that U.S. firms and Taiwan firms are the key actors in these global networks has a couple of direct implications for us. First, if we're concerned about the transfer of technology to China because we're concerned about the position of Taiwan, then we ought to—we must develop a strategy in combination with Taiwan firms because Taiwan firms are transferring much more technology to the China mainland than U.S. firms are. Take a look at semiconductors for a case study of this.

The triangular relationship means that Taiwan has a huge surplus with China, \$40 billion, while China has a huge surplus with the United States. The relationships are quite complex.

Most importantly, the fact that these networks are organized by U.S. firms means three things.

Number one, U.S. companies and workers earn significant amount of money from the product that comes out of China.

Number two, U.S. consumers pay lower prices because these networks are extremely competitive, dynamic that bring goods quickly and cheaply out of China for the U.S. We can see this in the case of personal computers with Dell computers. The price of a new Dell computer for the local elementary school has dropped from \$1200 to \$600 in the last year. Why? Because now they come out of China instead of out of Taiwan. And, finally, the fact that these networks are run by U.S. companies, just as Dean Cowhey pointed out, means that the low-cost production in China allows our standards, our products and our design platforms to prevail in an atmosphere of intense global competition. It's not enough that our technologies be good. We also have to have a low-cost way to implement them in order to prevail against competing Japanese, European and even Chinese standards. And thus far, this connection between the U.S., Taiwan and China has served to do exactly that.

Thank you.

[The statement follows:]

**Prepared Statement of Barry Naughton, Ph.D., Professor of Economics
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***China's Economic Growth and Technology Development: International
Linkages and Implications for the U.S.***

Rapid Growth and Technological Development

As everyone knows, China is booming. Economic growth in 2003 hit 9.1%, despite a significant temporary slowdown in the second quarter due to the SARS epidemic. Production of passenger cars shot past 2 million units last year, 80% more than the year before. Exports grew 34.6%, but imports grew even faster, increasing 39.9%, and China emerged as the fourth largest trading nation in the world. Seen for years as a place of enormous economic potential, China is beginning to realize its potential.

The magnitude of change is especially striking in high tech industry, particularly electronics manufacturing. Some time during 2001, China emerged as the clear location of choice for new production and assembly operations by global electronics companies. Following a surge of investment, China's exports of computers and peripherals increased by 54% in 2002, and then doubled in 2003, reaching \$40 billion. Exports of electronics components, telecom equipment, and TV/AV equipment have doubled in two years, from 2001 to 2003, and surpass \$35 billion for the three categories together. The center of gravity of the global electronics assembly industry is moving to China.

China's domestic market has now grown to be large, on a global scale, for a number of high tech products: telecommunications equipment (infrastructure and handsets), consumer electronics (especially television and video), and personal computers. The confluence of these big downstream markets has created huge demand for upstream products, including integrated circuits, display panels, and other high technology components. The vast majority of these items are still supplied by imports, but China has witnessed, since 2001, the birth of a handful of modern semiconductor firms that are only about two years behind the international technological frontier. Even highly sophisticated industries like chip design have made a small but significant start in China.

China's rapid growth and dramatic technologic trajectory pose challenges to the United States. Like any economic relationship mediated through the market, the relationship has elements of competition and rivalry, as well as cooperation. However, it is a mistake to view the relationship solely or primarily in terms of rivalry. Rather, rapid Chinese technological development has come in the framework of international production networks that are predominantly coordinated by U.S. companies. Chinese firms fit into production, design and supply chains that are orchestrated by U.S. companies. These relationships work strongly to the advantage of U.S. companies and consumers. In the remainder of this testimony, I will put China's trade and technological relations in a broad context in order to highlight a few key features.

A Triangular Relationship

First: Taiwan is the key intermediary between the U.S. and China in high-technology industry. It is simply impossible to speak about high-tech industry in China without bringing high-tech industry in Taiwan to the forefront of the analysis. Taiwan has tremendous technological resources. It has a higher degree of dependence on electronics manufacturing and export than any other economy in the world. Taiwan is also the second-biggest investor in China, after Hong Kong. It is a much larger investor than either the U.S. or Japan. Moreover, in a big change from the early years when much of Taiwan's mainland investment was in light labor-intensive manufactures—such as shoes, garments, and sporting goods—for the past five years, Taiwan's investment has been overwhelmingly concentrated in electronics-related enterprises.

In 2002, the most recent year for which we have official Chinese data, Taiwan investment apparently made up 8% of incoming FDI in China. But FDI from tax havens including the Virgin Islands, Cayman Islands, and Western Samoa accounted for twice as much (16%) of incoming FDI, and it is known that the majority of this investment comes from Taiwan. Even if only half of tax haven investment were from Taiwan (a highly conservative assumption to allow some Hong Kong investment), then Taiwan accounts for 16% of total FDI, second to Hong Kong's 35%, and far ahead of number three U.S. (at 10%), or Japan (8%), and the EU-15 (7%). Data for 2003 are not available yet, but a preliminary ranking of the top ten investors has been published, and it shows continued growth of tax haven investment,

with Western Samoa rising rapidly in popularity. Thus, the Taiwan share has almost certainly increased further. In addition, both Korea and Japan significantly increased their FDI in China in 2003, and moved ahead of the U.S. for the first time since 1997 (in the case of Japan) or even (in the case of Korea).

Second: Taiwan firms, and now increasingly China firms, have been involved in a long-running partnership with U.S. firms. This partnership has been extremely beneficial to all sides. Initially with Taiwan and Singapore, but now increasingly centered in China, these partnerships have been crucial to the remarkable technological dynamism that the U.S. has displayed in the past ten years. In general terms, U.S. firms managed to create a division of labor in which U.S. firms concentrated on research and development, but also on the creation of new products and new technological standards, while portions of the manufacturing were carried out in various places in the “China Circle,” or greater China. Whether the technology was the Internet, or the defining standards of the personal computer—the Intel processor and the Microsoft Windows operating system—U.S. companies set the standards. However, the ability of U.S. companies to actually set the standards depended on their ability to also produce the systems for a price that could earn consumer acceptance. Standards were not just mandated by powerful corporations: they had to win acceptance in an intensely competitive world market. And win acceptance they did, frequently to the disadvantage of firms in Japan or Europe.

This process was clearly at work in three key sectors: microprocessors, computers, and hard disk drives. In all three of these areas, U.S. firms faced vigorous competition from Japanese firms in the 1980s. By the mid-1990s, in each of these cases, U.S. firms had turned back the Japanese firms, and had established their systems as clearly predominant in the world market. It was not a simple matter of technological superiority. In many of the most relevant fields (such as magnetic storage capacity), Japanese technology was equal, or superior, to U.S. technology. Rather, U.S. firms prevailed by creating open, “modular” production networks that delivered lower costs and much faster time to market than Japanese firms were able to provide. Open technological systems in which any producer could “plug in” to the completed product, so long as he conformed to the dominant technological standard, proved to be superior from a cost standpoint. This permitted production chains to become vertically dis-integrated, allowing individual firms to specialize in the specific link of production in which they could be most efficient. The producers who emerged to fill this role were overwhelmingly located in the broader Chinese region. Sometimes these were U.S. firm subsidiaries or joint ventures, and sometimes they were indigenous firms in Taiwan, Hong Kong, or Singapore. China region firms developed substantial technological and manufacturing capacities in partnership with U.S. firms. In turn, they provided the low-cost manufacturing that enabled U.S.-based design standards and products to prevail.

During the mid-1990s this model was simply pushed one step further onto the China mainland. As producers in Taiwan and Singapore moved up market, to more sophisticated components, they increasingly moved labor-intensive final assembly stages to the China mainland. There, they replicated the patterns which they themselves had pioneered in partnership with U.S. firms. Producing sometimes through their own subsidiaries, and sometimes by subcontracting to indigenous firms, they began to build electronics industry clusters on the mainland, initially specializing in final assembly. This system has had three important corollaries:

1. China is a lot less high tech than it looks. Most Chinese “high tech” exports have actually just been assembly jobs, putting together high-tech components, brought in from the rest of Asia.
2. Trade fit into a triangular pattern. China imported enormous quantities of components and sub-assemblies, and then exported finished products, primarily to the U.S.
3. China established a whole system of “processing trade” (discussed in detail in Professor Hanson’s testimony) to allow imported inputs to enter the country easily and without tax, so long as they were promptly assembled and re-exported. This part of the Chinese economy was low tax and free of government interference, even when the government was trying to steer the rest of the economy. It grew up under the predominant influence of U.S. and Taiwan firms and investors.

In the last few years, some important changes have meant that this simple picture is no longer quite so simple. The export system is no longer as completely separated from the domestic market as before, and the traditional triangular trade is rapidly upgrading. Nonetheless, the fundamental framework is intact.

Opening The Domestic Market

In the earlier stage of China's export development, the export economy was quite separate from the domestic economy, which was protected by trade barriers and subject to pervasive government attempts to steer economic and technological development. With China's entry into the World Trade Organization (WTO), this is now beginning to change. While China's implementation of WTO commitments has been uneven, and frustratingly slow in some areas, the bottom line is that WTO entry really is transforming the Chinese economy and making it much more open. We can see this by examining trade statistics for "Ordinary Trade" imports: that is, goods imported for the Chinese domestic market, not involved in any export-processing regime. Even as overall trade and imports have grown rapidly, Ordinary Trade imports have grown much more rapidly, and have sharply increased their share of total imports. Ordinary trade imports in 1997 were only 27% of total imports, and only 4.3% of GDP. By 2003, this figure has soared to 46% of total imports, and a remarkable 13% of GDP. Ordinary Trade imports have grown 30% per year since 1997 (including a 46% jump in 2003). U.S. companies that used to produce in China only for export are now beginning to develop mixed strategies that target the Chinese market as well. As China opens its domestic distribution networks this year and next year, those strategies will become increasingly powerful. (For example, Dell Computer, which is already gaining market share in China's domestic market, will adapt a range of new sales initiatives.)

Moreover, there has been a dramatic shift in the Chinese government's effort to shape China's technological trajectory. To be sure, the Chinese government is still aggressively interventionist, and tries very hard to foster national technological capabilities. But the old-style industrial policy, picking "national champions" and propping them up with loans and preferential policies, or forcing foreign firms to partner with domestic firms and transfer key elements of their technology—these policies are largely finished. They have been discarded by the Chinese government because they simply didn't work. Instead, the Chinese government now seeks to foster key domestic industries across the board, providing the same privileges to big and small firms and (more crucially) to domestic and foreign firms alike. The government promotes technological standards that it believes will give a competitive advantage to domestic firms. These policies are still sometimes intrusive and controversial, and occasionally push the boundaries of what is permissible. They are also policies premised on the belief that the most the government can do is temporarily influence market conditions, and if it acts skillfully, contribute to long-term development by providing temporary advantage to local firms.

Much more important is the investment in physical infrastructure and education the government provides. China's technological successes would be inconceivable without both. For example, the new network of limited access highways, now second only to the U.S. in length; and the fiber optic telecom backbone network, are both essential to economic progress. Even more important, a sustained effort in tertiary education has brought the proportion of China's work force with some college education (about half in 3-year technical schools) from a sorry 0.9% in 1982, to a respectable 4.7% in 2000 (But compare the 52% in the U.S.). The Chinese government's ability to sustain this investment effort has been far more important than the hit-and-miss fragments of "industrial policy," even in its most recent, relatively sophisticated, version.

A More Complex Triangular Relationship

The recent surge in China's technological development has been accompanied by a transformation of economic interactions beyond the simplest version of the triangular model. Originally, there were certain links in the production chain that were simply too technically sophisticated to be replicated in China, and the only activities in which China participated were the less sophisticated stages of global production chains. That has changed. But before we examine the differences, let's look at the continuities:

First, China's high tech exports still come predominantly from a few coastal clusters where foreign investment is concentrated. More than 80% of China's "high tech" exports in 2003 came either from Guangdong or from the Lower Yangtze (greater Shanghai) region. Well over half the total comes from five industrial clusters in Dongguan, Shenzhen, Suzhou, Kunshan, or Shanghai. Each of these clusters has lots of foreign investment, and a strong Taiwan presence. The producers are either foreign firms or closely linked subcontractors qualified by the foreign firms. Foreign firms continue to increase the share of China's exports they produce, reaching 55% in 2003.

Second, the triangular pattern of trade and deficits persists. China has a huge surplus with the U.S., but deficits with its East Asian neighbors that are almost

as large. The \$120 billion deficit with Chinese that the U.S. projects for 2003 is part of a network that also produces Chinese deficits of \$40 billion with Taiwan, a \$24 billion deficit with Korea, a \$15 billion deficit with Japan, and deficits of \$8 billion and \$5 billion with Malaysia and Thailand respectively. Most of the deficit with China's neighbors consists of semi finished goods or components. Overall, China runs a modest surplus (1.8% of GDP).

However, China's participation in these networks is no longer as predictable as before, and is not entirely confined to the final assembly stage. For example, China has begun to manufacture integrated circuits that are not far behind the world leading edge. These are the offshoot of the integrated circuit fabrication industry in Taiwan that caught up with the world technological frontier around 1995. The individuals now starting "trailing edge" IC factories ("fabs" or "foundries") in China gained their experience in Taiwan firms, and before that in U.S. firms. The outstanding example is Richard Chang (Zhang Rujing), head of Semiconductor Manufacturing International Corporation (SMIC), based in Shanghai. Literally thousands of engineers and managers have come from Taiwan to China to launch this industry. SMIC is now mass-producing chips at .18 micron, while Intel's new Prescott processor, released February 2, uses .09 microns. Thus, the gap between SMIC and Intel has shrunk to slightly less than 2 generations of chips. In related fashion, China—again following Taiwan—has begun to develop significant chip design facilities, with substantial government money going into training and research institutes. However, overall chip design capabilities are still rudimentary, and value of sales is limited: about U.S. \$200 million in 2002.

With China moving up the value chain into more sophisticated activities, and with output and exports exploding, is the old model obsolete? In fact, the underlying structure of the old model remains intact, while the networks undergo continuous rapid upgrading. The result is an increasingly detailed and increasingly complex division of labor. Certain skills that were once scarce, are gradually diffusing, and China has taken advantage of this trend, and is in turn a major beneficiary. The ability to manufacture sophisticated ICs is becoming much more widespread. East Asia (outside Japan but including China) has dramatically increased its share of global production, and the European industry has also revived. But while IC fabrication skills have diffused, the sophistication and complexity of the entire value chain—including design, fabrication, and integration into final uses—has continuously increased. As the chips themselves have developed much more capacity and are much cheaper (following Moore's Law), other parts of the value chain, such as chip design, loom larger in the overall cost structure. Moreover, downstream uses for the chips diversify away from the formerly dominant personal computer, to include all kinds of new applications: new wireless products and digital video products, especially. These diverse end products imply even greater demands on the design process, particularly with the advent of complex "system on a chip" (SOC) products. Therefore, designers have been forced to de-construct the design process, breaking it down into discrete steps, creating re-usable modules, and "mechanizing" some activities, in a way that echoes what happened to the hardware production process beginning thirty years ago. Stages of the design network are relocating to Asia (first Taiwan, then China) as well.

In this process, production and design networks are becoming so much more complex that they can no longer be reduced to any simple, uniform characteristic. Nor can China's participation be pigeon-holed as it could earlier. But we can ask: Are these changes overturning the kinds of relationships that existed earlier, or are they extending them? The answer is clearly that these are evolutionary changes that are highly consistent with the pre-existing relationship among firms in the U.S., Taiwan, and China. In the case of IC design, for example, specialized design firms provide the most sophisticated design services, and also produce the design "building blocks" that must be integrated into a specific chip design. In order to tie together various processes efficiently, leading multinational corporations attempt to develop "platform leadership" strategies in which they make decisions about the overall system architecture, the interfaces among different parts of the design, and the degree of intellectual property protection they seek to maintain. In both these stages, U.S. firms play a predominant role. Specialized global suppliers of design building blocks are predominantly U.S. (indeed, California) firms, including MIPS, Rambus, and DSP. "Platform leadership" is exerted by large multinationals like Cisco, Dell, or Intel. These "Global flagships" preside over both global production and global design networks. Firms in China, and in Taiwan (which still overshadows Chinese firms in design capabilities) are integrated into this overall system. Because design building blocks are still a long way from fully codifiable "plug and play" elements, ongoing technical assistance and sharing is required, and firms stress long-term cooperative relations with their design and manufacturing partners.

American Firms Are Architects of Global Networks That Incorporate China

American firms, in other words, still play crucial roles as the architects of global design and production networks. U.S. firms manage these networks so that, whenever possible, there are multiple suppliers in China. The high-tech clusters—such as the five clusters that account for more than half the hi-tech exports—generally have multiple suppliers in close proximity competing for similar business. The network architects maintain a degree of competitive pressure, even as they build long-term cooperative relations with their most reliable, and highest quality suppliers. Taiwan intermediaries often cooperate in maintaining this intense cost pressure on suppliers.

Indeed, this kind of structure is common in U.S. trade relations with China, even outside the high-tech sector. Companies that bring in running shoes, toys, or garments nearly always maintaining contractual ties with a number of local suppliers. Moreover, enormous changes—and significant productivity gains—have taken place in American retailing and distribution in the past twenty years due to the sustained focus on reducing inventory. A single-minded focus on reducing inventory has led American retailers to insist that suppliers produce smaller batches, deliver goods more quickly, and demonstrate greater flexibility to respond to constantly changing demand. Where have U.S. retailers found suppliers willing and able to do this? In China, of course, with the relationship again mediated by Taiwan and Hong Kong businesses. It is not an accident that the American retailer with the most sophisticated inventory management techniques, Walmart, is also the largest importer of goods from China (\$12 billion last year).

These production networks, and the American position in them are strongly beneficial to the U.S., in three respects:

- (a) U.S. corporations, controlling the design, supply, and marketing channels, earn the bulk of the revenue from sales in the U.S. of goods produced by them in China. For example, Seagate's Wuxi factory exported \$1.22 billion worth of hard disk drives in 2002, predominantly to the U.S. However, this one factory also imported \$1.27 billion worth of components in that year. Value-added in China was a small percentage of the value of the goods imported by the U.S., certainly less than 10% of the total. More crucially, a rough calculation indicates that over 50% of the value of those goods accrued to U.S. citizens, either as wages in design, research, or marketing; or as profits. (Another 30–40% accrues to residents of other Asian countries who produce components assembled in China.)
- (b) U.S. consumers pay much less for goods. For example, the fact that American students and schools can now buy an excellent Dell Computer desktop for about \$500 is the result both of technological progress and the transplanting of Dell's formerly Taiwan-based networks to the mainland.
- (c) Potentially most important: the partnership of U.S. corporations and China-based factories has enabled the success of U.S. research and corporate strategies. In a world marked by globalization and intensifying competition worldwide, the remarkable successes enjoyed by U.S. corporations—and the U.S. economy—in the past ten years have been by no means fore-ordained. The U.S. has increased its economic weight among the OECD (developed) countries, and increased its technological importance as well. The fact that it has been able to do so is of course primarily due to U.S. domestic factors, but the partnership between the U.S. and China region producers has been a key enabling factor. China production has allowed U.S. producers to implement low-cost solutions that have led to the competitive success of their strategies, products, and standards. The networks that enable that kind of success are becoming even more complex, and more inter-dependent, and their contribution to U.S. technological and competitive capabilities are probably increasing.

Conclusion

The major economy that has lost relative position in the global economy in the 1990s was Japan. A major contributing factor was Japan's historic crisis and its relative withdrawal from Asia and the world (Japan's share of global trade and outgoing FDI declined substantially during the 1990s.) That is exactly the point: Pre-occupied with its own problems, Japan did not take advantage of the opportunities on which U.S. firms seized. They missed the opportunity to restructure their production networks, bring Asia and China closer into the production chain, and push down their own production costs. Recently, Japan has re-assessed its position. Restructuring in Japan—particularly in the electronics industry—has accelerated. Investment in China has surged, and surpassed U.S. investment last year for the first time since it fell behind. At this juncture, exactly what the U.S. should NOT do is

to emulate what Japan did in the 1990s. According to Ernst (2003), the Japanese tried “to retain an unequal division of labor that kept[the] development and production of leading-edge and high value-added products and production stages in Japan. They also tried to minimize possible leakages of technological knowledge. But their capacity to sustain this flying geese pattern of specialization [was] gradually eroded by intensifying competition both from above and below.” It would be particularly ironic if we launched onto this failed path just as Japan, coming out of a lost decade, was committing itself to a renewed involvement in China and Asia.

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Vice Chairman D'AMATO. Thank you very much, Dr. Naughton.

We're going to move up the coast now. We have been spending our time in San Diego. Dr. Fung is from Santa Cruz, University of California.

**STATEMENT OF K.C. FUNG, Ph.D.
PROFESSOR OF ECONOMICS
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Dr. FUNG. Thank you.

I appreciate the opportunity to speak in front of you. It's an honor to provide some statements for this hearing. First, I would like to update, and as a matter of providing some background, some of the features that—implications for the U.S.-China relationship concerning China's trade and foreign direct investment. And in particular there's six aspects I just want to quickly highlight. One is that increasingly China's trade is more and more conducted by foreign invested enterprises.

For example, in 2003 more than half of China's exports are now conducted by foreign firms. What that implies for foreign and U.S. multinational firms is that there is a great opportunity for them to participate in the explosive growth of China's trade. For example, the rate of return for U.S. multinationals in 2002, according to U.S. statistics in computer and electronic products, would be estimated to be more than 20 percent. Secondly, more and more of China's trade, even though it's still large, is now shipped more directly, bypassing Hong Kong even though reexports through Hong Kong in 2003 still exceeds 25 percent.

Thirdly, China's trade in foreign direct investments are still very geographically concentrated even though Guangdong's share of Chi-

na's exports still account for about 35 percent in 2003. It is increasingly losing its share to Shanghai.

Fourth, much of China's trade is really, as Dr. Barry Naughton testified, related to processing and assembly. In 2003 more than half of China's exports are processed exports. What that implies is the domestic value added generated by Chinese exports to the United States would be relatively low.

One study put the estimate of domestic value added at about 19 cents for each dollar. Fifth, there is, according to official statistics, increasing amount of Chinese exports of high-tech products. More than a quarter of Chinese exports are now classified as high tech, even though it's very difficult to find out exactly how they come up with different classifications of high tech. Sixth, and lastly, more and more of the foreign direct investment in China are not joint ventures; they're wholly foreign owned. Almost 70 percent of foreign direct investments take the form of wholly foreign-owned enterprises. And, of course, except for Virgin Islands, the United States is the second-largest direct investor in China in 2002.

Next, I want to move on to the economic roles of China in the Asia-Pacific region. As pointed out several times by Professor Barry Naughton, as well as Dean Cowhey, there are really two aspects of China in the eyes of foreign multinationals. And that's somewhat unusual for a developing economy that these two aspects go hand in hand together.

That is, one, at the same time it is a large and growing market with a domestic large market for affiliate sales. And, second, it is also a low-cost center of manufacturing. First, for the large and growing market aspects, from different sources, U.S. and Japanese—their investment in China are aiming much more at the domestic market compared to other sources of direct investment, such as those from Hong Kong and Taiwan.

Surveys from the Japanese government also highlighted that Japanese multinationals would sell almost half of the products in China. In general, the rate of return, given the improvement in the business climate in China for U.S. direct investment in general is estimated to be about 14 percent, higher for computer and electronic products.

In terms of China being a low-wage production site, Hong Kong and Taiwanese multinationals are a lot more responsive to low wages compared to U.S. and Japanese. Both Japanese and U.S. companies seem to place a heavier emphasis on skilled labor in the Chinese market compared to Hong Kong and Taiwanese companies.

Again, the Japanese government survey pointed out that Japanese multinationals locate in China first because of low wage reason and, second, because of the domestic market reason. Next I want to move on to the effects of China on the United States and its neighbors. Now, the aspect of China being a large market, by and large, is obviously a positive for most of its neighbors, as well as for the U.S. However, if you view the U.S. as a low-wage export platform, is there a case or scenario whereby multinationals would choose to invest in China instead of other locations, such as Malaysia?

One study—two recent studies pointed out that, at least for the data we have from 1985 to 2001, the levels of foreign direct investment in China seem to be going hand in hand and complementary to foreign direct investment in other Asian economies such as Taiwan, Singapore, Korea, Thailand, Malaysia, Philippines and Indonesia.

However, it does reduce the shares of foreign direct investment in those economies as a proportion of all the direct investment into Asia and also as a proportion to all the direct investment to all developing economies.

So, so far, the levels are complementary, the amount are complementary, but the shares are going in the opposite direction with China gaining a larger share compared to these economies. The fact that the levels of foreign direct investment in China are complementary are consistent with what Professor Barry Naughton, as well as Dean Cowhey, described as the production sharing, or China being an important link in the global supply chain.

So while you might invest in the production of hard disk drives in China, but at the same time you would want to invest in Korea to produce liquid crystal displays. And they would exchange these components and parts. And estimation about domestic value added from such participation of the global supply chain in the area of high tech, such as electric machinery and instrument, as well as electronic and communication equipment, it tends to be still relatively modest. One dollar of Chinese exports of these high-tech items would generate about 14 cents for China in terms of domestic value added. Now, the future, of course, may look different, but that's the existing study. Just to conclude quickly, just three remarks. One is that China's development strategy so far seems to look very different from the development strategy pursued by Japan or Korea. These two economies from the outset actively preclude foreign direct investment, whereas, China from the outset actively encouraged foreign direct investment.

So in that regard, multinationals have a greater chance to participate in China's growth compared to the Japanese growth experience. Secondly, the stock of U.S. direct investment in China is really still relatively small. By 2002 less than 1 percent of the stock of U.S. direct investment in the world was really in China.

The bulk of it, of course, as we know, foreign direct investment from the U.S. is primarily to other rich industrialized countries.

Now, in the 1960s and the '70s when several European countries embarked on their European integration, it was often feared by both academics, as well as policymakers, that there would be a wholesale restructuring of industries of these European economies, such as Italy losing the entire auto sector to Germany; but it turns out not to be entirely correct. What happened was a slice of the auto industry would be lost from Italy to Germany so that Germany would import Italian sports car by the same time Italy would import German luxury cars.

It seems that this is happening with the case of China's integration in the global economy except through intermediate goods. There is now specialization on components and parts. And these economies, particularly in Asia, are now exchanging both import and export to each other, these components and parts. For the

United States, clearly for the low-cost industries, such as apparel, furniture and so on, there has been and there will be great dislocations. But at the same time, for some industries, such as high tech, I think the business model of global supply chain, as well as the two-way trade of components and parts, would make it a lot easier for the sector to adjust.

Vice Chairman D'AMATO. Thank you very much. Why don't you go ahead and finish up, and we'll go—move on.

Dr. FUNG. Thank you.

Finally, just to say that the Chinese global—growing market also would represent concrete benefits to American multinationals. Thank you.

[The statement follows:]

**Prepared Statement of K.C. Fung
Professor of Economics, University of California, Santa Cruz**

Trade and Investment: China, the United States, and the Asia-Pacific Economies

1. Characteristics of China's Trade and Foreign Direct Investment

China's open door policy has been an economic as well as a political success (Shirk 1994). China's trade and direct investment have some interesting characteristics. In this introductory section, I will first describe some of these stylized features. In particular, I would like to highlight six aspects.

First, a substantial amount of China's trade is conducted by foreign-invested enterprises. In 2003, foreign firms conducted 56.2% of China's imports and 54.8% of China's exports. To a very large extent, China's trade is quite heavily dependent on enterprises from other economies (Naughton, 1996, Fung 1998). Because of the involvement of foreign-invested enterprises in China's exports, this implies that foreign firms, including U.S. firms do directly benefit from the explosive growth of China's trade with the rest of the world. In 2002, the rate of return for U.S. multinationals in computer and electronic products can be estimated to be 21.2%.

Second, a large amount of China's trade is first shipped to Hong Kong and then re-exported (Feenstra and Hanson 2004, Fung 1998). In 2003, 28.3% of Chinese exports to the world was re-exported via Hong Kong, while 21.9% of Chinese imports from the world was first sent to Hong Kong before re-exported into China. The large extent of re-exports is quite unique to China's trade. One business implication of the importance of re-exports in China's trade is that in evaluating the export market potential of China, one will need to take re-exports into account. A policy and a research implication is that the bilateral trade data of most countries with China need to be adjusted, including those of the United States, Japan, the European Union and Canada (Feenstra, Hai, Woo and Yao 1999). Using adjusted official U.S. data, the adjusted estimate of United States-China bilateral trade balance for 2002 is \$76.6 billions (Fung and Lau 2003).

Third, China's trade and foreign direct investments are geographically concentrated. In 2003, Guangdong's imports accounted for 31.7% of China's total imports, while Guangdong's exports accounted for 34.9% of China's total exports. Most of China's foreign direct investments still flow to the east and coastal areas. In 2002, the east and southeast coastal areas (Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan, Beijing, Tianjin, Hebei, Liaoning and Guangxi) received 89.5% of all realized foreign direct investments.

Fourth, a large percentage of China's trade is related to processing and assembly. In 2003, 55.2% of China's exports are processed exports, while 39.5% of China's imports are processed imports. Typically processed exports have lower domestic value-added than non-processed exports. On average, the domestic value-added of Chinese exports is still relatively modest. In 1995, \$1 worth of aggregate Chinese export to the United States induces a direct domestic value-added of \$0.19 (Chen, Cheng, Fung and Lau 2001).

Fifth, according to China's Custom Statistics, in 2003, China exported \$110.3 billion (25.2% of China's total exports) of high-technology products. It also imported \$119.3 billion (28.9% of total imports) of high-technology goods. However, it is not entirely clear how these figures are calculated from the various classifications in the trade data. At any event, two-way trade of high-technology goods seems to be substantial. This partly reflects the fact that in certain industries, China is now a part

of the global supply chain network and thus it engage in both importing and exporting of various components and parts (Roach 2003, Rauch 2001).

Sixth, most recent foreign direct investments in China are not joint ventures. Instead, they take the form of wholly foreign-owned enterprises. In 2002, 69.2% of contracted foreign direct investments were wholly foreign-owned. In 2002, excluding the Virgin Islands, the United States is the second largest direct investor in China. There is no particular reason to expect that U.S. investments in China to have different modes of ownership that differ significantly from the general pattern. This implies that U.S. multinationals will increasingly have greater controls of their operations in China.

2. Economic Roles of China in the Asia-Pacific Region

China plays several important economic roles for its neighbors and to foreign and U.S. multinationals. Typically developing economies attract U.S. and other multinationals because of their low wages. Industrialized economies such as the United States and the European Union, on the other hand, attract foreign direct investment because of their large market sizes. For the case of China, these twin aspects—a large and growing market and a low-cost but high-quality labor force—come together. Thus U.S. and Asian firms are attracted to China because of its dynamic, large and rapidly growing economy as well as its cheap labor.

2.1. China as a large and growing market

Existing economic studies support the view that the domestic market of China is an important determinant of foreign direct investment in China (Cheng and Kwan 2000, Fung, Iizaka and Parker 2002, Fung, Iizaka, Lin and Siu 2002). Furthermore, multinationals of different countries place somewhat different degrees of emphasis on the importance of the domestic market of China. U.S. and Japanese direct investments tend to be more responsive to a larger market in China than firms are from Hong Kong and Taiwan (Table 1). For example, a one-percent increase in the provincial gross domestic product (GDP) will induce an increase of 0.76% of U.S. direct investment, but only 0.40% of Hong Kong investment.

Several surveys also show that multinationals sell significant shares of their products produced in China in the local Chinese market. According to the Ministry of Economy, Trade and Industry (METI) of the Japanese government, in 2001, Japanese affiliates in China and Hong Kong sold 47.2% of the products locally. According to a survey done by Chung Hua Institution of Economic Research in Taiwan, U.S. multinationals sold more than 80% of their products produced in China locally (Fung, Lau and Lee 2004). Finally in the area of high-technology, according to reports from the American Electronics Association, China is now already the third largest information technology market in the world. China is also the third largest semiconductor market in the world, behind only the United States and Japan. It is often reported that China is not an easy place to do business, but it seems that the U.S. multinationals are increasingly benefiting from the booming domestic Chinese market. In general, the rate of return for U.S. direct investments in China in 2002 is estimated to be 14.1%.

2.2 China as a low-wage production site

Economic studies also show that China's low wage rates and its quality of labor are important determinants of foreign direct investments (Chen and Kwan 2000, Fung, Iizaka and Parker 2002, Fung, Iizaka, Lin and Siu 2002). Hong Kong firms are particularly lured by the lower Chinese wages. U.S. and Japanese direct investments do respond to the wage rates in China, but their responses are less pronounced compared to Hong Kong and Taiwanese multinationals. In contrast, Japanese and U.S. companies place more emphasis on the quality of labor than other Asian multinationals (Table 1). For example, a one-percent reduction in Chinese provincial wage rate will increase Taiwanese direct investment by 2.64% but will only increase U.S. direct investment by 1.79%. A one-percent improvement in the provincial Chinese quality of labor will raise Japanese direct investment by 1.29% but will only increase U.S. direct investment by 0.97%.

A survey by the Japanese government also shows that cost consideration is the number one motive for Japanese multinationals to locate in China (Table 3). The same survey shows that expanding market shares in China and Hong Kong is the second most important motive for investing in China. Thus from both econometric studies as well as survey data, China is seen by multinationals as both a low-cost production site as well as a place where they can sell their products through their affiliates.

3. The Effects of China on the U.S. and Its Asian-Pacific Neighbors

As a large and growing market, China increasing plays the role of a locomotive in the Asia-Pacific region. This aspect of China is demand-enhancing and investment augmenting. To the U.S. multinationals, the Chinese market represents a profitable opportunity (Table 4). Unlike the Japanese growth experience, China's development strategy so far is one of relative inclusiveness. By welcoming foreign firms, it allows foreign companies to participate and to benefit from its rapid growth.

As a site for low-cost manufacturing, China represents an opportunity for U.S. multinationals to cut their costs of production. By cutting their costs, U.S. firms obviously will increase their global profits. However, if U.S. and other foreign multinational corporations view China mainly as a low-wage export platform, then they may consider investing in China instead of in other locations. This may reduce direct investments in other countries and reduce their economic welfare.

Recent economic studies so far suggest that foreign direct investment in China is *complementary* to direct investments in other Asian-Pacific economies, including Hong Kong, Taiwan, Singapore, Republic of Korea, Thailand, Malaysia, the Philippines and Indonesia. On average, a one-percent increase in foreign direct investment into China will raise direct investment into China's neighboring economies by 0.55%, even though it will reduce the shares of investments of these economies as a proportion of total Asian and developing countries' direct investments by 0.23% and 0.19% respectively. Thus in terms of levels of foreign direct investment, the presence of China is investment augmenting, even though China does seem to reduce the shares of foreign direct investment of its regional neighbors.

The fact that direct investment levels in China are complementary to direct investment levels in its neighbors is consistent with the view that China is not only viewed by foreign and U.S. multinationals as a low-wage export platform, but also as an important link in the global supply chain. In this business model, the value chain is sliced thinner and thinner and each stage of production is parceled out to a different specialized site to minimize global costs of production.

In the immediate geographic vicinity of China, this network of production-sharing is especially pronounced among the three members of the China Circle (China, Hong Kong and Taiwan) and in certain industries such as technology goods and components (Naughton 1997, 2004, Roach 2003). Being an important site for global production-sharing, China will both import and export goods that belong to the same industry such as electrical equipment (Table 6). In 2003, China imported and exported significant amount of items in the category of electrical equipment to its neighbors. Except for Indonesia, exports and imports of goods, components and parts in the electrical equipment industry rank either as first or second in the trade of these economies with China. The two-way trade of many goods, including those within electrical equipment also raises the issue of how much domestic value added China derives from such trade. Existing studies seem to suggest that the domestic value-added generated by such types of Chinese exports is not exceptionally high, particularly for processed exports (Table 7). In the case of processed exports of electric machinery and instrument, the total domestic value-added generated amounted to an estimated 14.4%, while for processed exports of the manufacture of electronic and communication equipment, the corresponding estimated total domestic value-added is 13.8%. In general, for processed and non-processed exports combined (aggregate exports), the domestic value-added generated tend to be higher.

4. Concluding Remarks

China's trade and foreign direct investment have some distinctive characteristics. Some of these characteristics have business and policy implications for the United States. By allowing foreign firms to substantially participate in its external sector, China is often seen to be more open than many economies at similar stages of economic development.

Unlike many developing and transition economies, China attracts many foreign multinationals because of both its large and booming domestic market as well as its cheap but high-quality labor. However, to many foreign firms in the high-technology sector, China is not only a cheap export platform, but it is also an important link in the global supply chain.

It is important to put the presence of U.S. firms in China in perspectives. In 2002, less than 1% of the stock of U.S. direct investment in the world was in China. In 2001, less than 4% of the employment of the non-bank majority-owned U.S. affiliates abroad was located in China. It will take a long time before China can come close to have the amount of U.S. direct investment and associated employment in countries like the United Kingdom or Canada.

In the 1960s and the 1970s, when several European countries embarked on the first stages of European economic integration, it was often feared that in some countries, whole industries or sectors would disappear. Later on this was proven to be inaccurate. A slice of an industry may move from Germany to Italy, but countries would specialize in niches of the same industry and trade with each other. For example, Italian sport cars are exported to Germany, while Germany luxury cars are exported to Italy. Most researchers now believe that due to such horizontal two-way trade, economic adjustments took place within industries and were not as large as first feared.

For the case of China, a similar situation may occur. The economic integration of China into the world market system will increase global efficiency, but it will also cause dislocations and in some situations, large dislocations. However, countries in the Asia-Pacific will adapt to specialize in various stages of the global production process and expand their trade of differentiated components and parts with each other. For example, Korean liquid crystal displays may be exchanged with Chinese motherboards. The increased vertical two-way trade of intermediate goods between China and its neighbors will reduce their costs of economic adjustments. At the same time, China's rapidly growing market represents concrete benefits to China's Asian neighbors as well as to the United States.

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Appendix

Table 1. Determinants of Direct Investment in Different Provinces of China

	U.S. Direct Investment	Japanese Direct Investment	Hong Kong Direct Investment	Taiwanese Direct Investment
1% increase in Gross Domestic Product	Increase by 0.76%	Increase by 0.71%	Increase by 0.40%	Increase by 0.58%
1% increase in the Wage Rate	Decrease by 1.79%	Decrease by 1.57%	Decrease by 2.66%	Decrease by 2.64%
1% improvement in Labor Quality	Increase by 0.97%	Increase by 1.29%	Increase by 0.43%	Insignificant

Source: Fung, Iizaka and Parker (2002).

Table 2. Destinations of Sales of Japanese Affiliates in 2001

	Locally (%)	Exported to Japan (%)	The Third Country (%)
China and Hong Kong	47.2	31.5	21.3
ASEAN4	38.8	28.1	33.0
NIE3	59.1	17.7	23.2
Asia	48.8	24.7	26.5
World	70.0	10.9	19.1

Source: METI (2002).

NIE3 includes Taiwan, Singapore and Republic of Korea.

ASEAN4 includes Thailand, Indonesia, Malaysia and the Philippines.

Figures may not add to 100% due to rounding.

Table 3. Motives behind Japanese Direct Investment, 1999

Motive	China and Hong Kong (%)	ASEAN4 (%)	NIE3 (%)	World (%)
Reasons related to lower costs	40.1	37.6	31.0	30.0

Table 3. Motives behind Japanese Direct Investment, 1999—Continued

Motive	China and Hong Kong (%)	ASEAN4 (%)	NIE3 (%)	World (%)
To expand their market shares in the country	20.9	19.4	24.1	24.3
To re-export to Japan	8.9	6.7	5.7	5.8
For research and development	0.7	0.1	1.0	1.8

Source: Fung, Iizaka and Siu (2003), METI (2001).

NIE3 includes Taiwan, Singapore and Republic of Korea.

ASEAN4 includes Thailand, Indonesia, Malaysia and the Philippines.

The answers are percentage of firms that pick that reason as their motives.

To save space, other motives have been omitted.

Table 5. The Effects of Foreign Direct Investment in China on Other Asian-Pacific Economies

	Levels of Foreign Direct Investment in China's Neighbors	Foreign Direct Investment in China's Neighbors as Shares of Total Foreign Direct Investment in Asia	Foreign Direct Investment in China's Neighbors as Shares of Total Foreign Direct Investment in all Developing Countries
An increase of 1% of foreign direct investment from the world to China	Increase by 0.55%	Decrease by 0.23%	Decrease by 0.19%

Source: Busakorn Chantarasawat, K.C. Fung, Hitomi Iizaka, and Alan Siu (2003a, 2003b).

The studies examine the effects of China's foreign direct investment on foreign direct investment inflows into Hong Kong, Taiwan, Republic of Korea, Singapore, Thailand, Malaysia, the Philippines and Indonesia.

Table 6. China's Two-Way Trade of Electric Equipment with its Neighbors, 2003

	Exports of Electrical Equipment to China (US\$1,000)	Rank in Exports to China	Imports of Electrical Equipment from China (US\$1,000)	Rank in Imports from China
Taiwan	17,075,435	1	2,470,679	1
Republic of Korea	13,224,831	1	4,122,382	1
Singapore	3,432,677	1	2,869,225	1
Thailand	1,984,551	2	888,914	2
Malaysia	7,179,539	1	1,587,136	2
Philippines	4,251,766	1	890,895	1
Indonesia	346,577	7	632,660	3

Source: China's Custom Statistics Monthly, 2003, December.

Table 7. Domestic Value Added Induced US\$1 of Chinese Exports, 1995, (US\$)

	Manufacture of Electric Machinery and Instrument	Manufacture of Electronic and Communication Equipment	Weighted Average of All Sectors
Direct Domestic Value-Added of Processed Exports	0.128	0.128	0.153
Total Domestic Value-Added of Processed Exports	0.144	0.138	0.176

**Table 7. Domestic Value Added Induced US\$1 of Chinese Exports, 1995,
(US\$)—Continued**

	Manufacture of Electric Machinery and Instrument	Manufacture of Electronic and Communication Equipment	Weighted Average of All Sectors
Direct Domestic Value-Added of Aggregate Exports	0.148	0.155	0.240
Total Domestic Value-Added of Aggregate Exports	0.257	0.243	0.545

Source: Chen, Cheng, Fung and Lau (2001).

Vice Chairman D'AMATO. Thank you very much, Dr. Fung.
And we'll move right on to Dr. Scott Rozelle from the University of California, Davis.

**STATEMENT OF SCOTT ROZELLE, Ph.D.
PROFESSOR OF ECONOMICS
DEPARTMENT OF AGRICULTURAL & RESOURCE ECONOMICS
UNIVERSITY OF CALIFORNIA, DAVIS**

Dr. ROZELLE. It's my honor to give testimony here. And I thank the organizers for inviting me and look forward to rich discussion here today. I'll be talking about the rural economy in particular. And what I want to do is make several comments that are in my written testimony, but try to sum up some of the key points. Two decades of economic reform have really changed the economic landscape of rural China. Per capita grain output has reached developed country levels. Rising imports—exports demonstrate that China is now able to compete in international markets off the farm. More than 200 million rural residents have found employment over the last ten years. Rural incomes have grown at 5 percent a year. But while this new landscape have many things that are very positive, China's rural areas are plagued with serious problems. The biggest problem is the fiscal system. It's an antiquated urban bias system that's unable to transfer the large amounts of fiscal resources from urban to rural, from rich to poor. The rural financial system is also archaic, state-dominated, without incentives, laden with nonperforming loans. It's unable to intermediate capital for the rural economy. So given this background, what is the threat of China's rural economy to the U.S. economy? I would really say there's two to think about. One is direct. And that's the threat of the rural economy taking over markets from the U.S., U.S.—in particular, U.S. agricultural sector.

Although this is real—and I'm going to address it briefly right now—I want to say right up front that I believe in the grand scope of things that we're talking about here today that this is relatively minor.

In fact, China is probably going to help U.S. farmers as much as they're going to hurt them; probably help them more. As—let me address this first.

As China begins to integrate itself into world agriculture trade community, China's agricultural sector is going to be a force in some world food markets. Watch out for vegetables, fruits, livestock, agriculture. The cost of producing these labor-intensive commodities are sometimes less than 30 percent of the cost of pro-

ducing the same commodity here in California. Of the many goods I'm talking about, they include a whole spectrum of goods: apples, oranges, peaches, strawberries, vegetables, walnuts, et cetera.

My opinion is that China will gradually become the number one competitor of U.S. horticulture exporters, first in Asia and someday even in the U.S. markets for a number of commodities. So it's going to be a smaller number of commodities: garlic, honey, asparagus, other specialty goods.

This message, of course, does not make me very popular in my home state when I give talks to agribusiness in California or Arizona. But this is what I mean by a threat. Of course, when I give this same talk in Indiana or Illinois, the audience is much different. China's, by far, the largest importer of soybeans in the world. We predict that corn is going to be following very shortly, not to mention the rising imports of cotton, hides, wheat. So if there's a threat in one subsector, it's likely going to be offset by progress in the other. And if China isn't a threat on the supply side, it's not going to be on the demand side either as we think a little more broadly. In other words, China is not going to starve the world, as was once hypothesized by certain observers.

An alternative way, really, to ask this question is, does China have the technological know-how to make its agricultural increase in productivity in the coming decades? When we think about this, we need to think about productivity as in the agricultural sector of the U.S. It's grown at 2 percent a year for more than 100 years. And all of that increase in productivity has come from technology. So when we think about China, it—will China be able to have this technological know-how? If we look at its record in the past, the past they've done a good job in technology support of agriculture.

Productivity since 1980 has risen from 3 to 4 percent a year. What's behind it? Well, certainly there's reforms and changes of incentives, but we've calculated that almost half of that rise is from technology in the past. Every two to five years the typical China farmer will adopt an entire new basket of varieties.

The productivity of germ plasm today—that's in China's experimental station that's going to be the productivity embodied in the seed tomorrow—has risen at about 2 percent a year. So China has had the new technology in the past and it currently has a stock that it will get it into the immediate future. But China's longer-run future hopes is clearly being placed on plant biotechnology.

In 1999 China spent about 100 million U.S. dollars in PPP terms on plant biotech, more than the rest of the developing world combined.

But that's not the end of the story. In 2000 it announced a major push in plant biotech and planned to spend a half a billion dollars a year by 2005. That goal's almost being reached. And when it is reached, China's going to outspend the U.S. Government in plant biotech research, though China doesn't have a private research sector in agriculture.

So China will still be spending less because it doesn't have the private companies to do so. China had used these funds in the past to create true technological breakthroughs. It has the only gene-insertion method that can rival Monsanto's. It has its own varieties of BT cotton. And it's almost ready to release a novel rice variety,

which would become China's first real GM food crop that stacks two insect-resistant genes into a single seed. Such technology, China believes, will help it produce more food or at least the same amount of food at lower costs to keep its economy successful. And, of course, it's not going to starve the world.

If any part, however, of the rural economy will directly—we're still talking about direct threats to the U.S. from the rural economy's perspective—it's probably its rural, labor-intensive industrial economy and its counterparts in small cities and towns. These are the areas that China's light industry manufacturing might has risen the most. I'm not an expert in this area of industrial policy and exports, but I have written several papers on the privatization movement of rural firms in which more than 1 to 2 million firms have been privatized since the 1990s, and most of them have enjoyed a rise of efficiency. I was also recently in rural parts of the booming coastal area and have been observing an emerging phenomena called industrial clustering. In one township 135 drill motor manufacturers, including Black & Decker and Makita, and every major company in the world, built factories in one development zone.

In another irrigation pump cluster of 500 firm manufacturers, they produce more than half of China's pumps and half of the world exported small pumps in three villages.

600 shirt makers in another village, makers of 95 percent of the world's glass frames in another township, silicone chips in another, Christmas tree decorations in another. These firms are self-organizing. They're private. They often have foreign direct investment as a seed. And they work under few regulations. They don't have lawyers to deal with contracts because when they regularly subcontract orders to each other or deal with subcontractors for parts, there are no written contracts. The firms are competitive, and they know how to manufacture many things. I think more manufacture—more competition is coming from these clusters.

Let me conclude with just mentioning the other potential threat, the one that's indirect. That's the one that's going to be realized in the event that the rural economy would become destabilized and, in turn, affect the stability of the rest of the economy.

This is based on an idea that the economy is suffering—rural economy is suffering from a relative deprivation versus the cities, and some observers believe that it's possible that rural residents would become disillusioned with the gross process turned from productive to destructive ones.

In its most violent form, farmers would turn into the age-old practice of rebellion that would slow down agricultural and rural production, weaken the confidence of investors and divert national resources to suppress this movement. For a number of reasons I really find little evidence that rural China is anywhere near this point of destabilized. I do realize there's increasing coverage in the press, in the news media, both inside and outside of China, of expressions of discontent and organized protests. I also know that there are acts of corruption that inflame the passion of villagers. But the statistical record would suggest that such realities, while every bit true at least in the first decade of the 20th century and maybe beyond, might be partly or fully offset by progress that has

been made. Above all, despite the rural urban income gaps, almost all rural residents have had higher incomes and have significantly larger asset bases than when the reforms began 20 years ago. Even those in the most poor—in the poorest decile, the poorest of the poor have increased at more than 2 percent a year. That's about the growth rate of the U.S. economy since World War II.

In short, rural households now have more income, they're more diversified, have more savings. I don't think they're going to be able to give up that—give up these things. These aren't only statistical based; they're based on my own observations. I spend six weeks to three months a year in rural China, and people, both Chinese and foreign who do the same—basically our observations accord with the statistics.

Direct observations show that rural people, while having many complaints, just like my farming grandfather always had lots of complaints, also have many plans for the future and starting new businesses, sending family members to the cities. I don't know if you're hearing a rosy picture of China or not. It should be taken with a note of caution. The last sentence, the policy package that will determine if this rural economy is stable or not is the one that's going to drive development into the future.

It's going to be a hard thing for China to—sorry—a hard thing and lots of resources and hard decisions to make to reform the institutions and to make the massive transfer of resources to the rural economy that will improve its fiscal system, its financial system and its rural governance.

That's what we have to look at. If that improves, the economy's going to be stable—the rural economy will be stable, and it won't be this indirect threat.

Thank you. I'll stop there.

[The statement follows:]

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The Rural Economy

Background

Two decades of economic reform have changed the economic landscape of China. Per capita grain output has reached developed country levels; many farmers shifted into higher valued crops, making decisions increasingly on market-oriented principles; the research system has helped push up productivity by almost double the rate of population growth, and the nation has by far the most sophisticated agricultural biotechnology program in the developing world—indeed many of its breakthroughs are of global importance. Rising food exports demonstrate that China's farmers are now able to compete in international markets. Off the farm, more than 40 percent of rural residents have employment; and about 100 million of them have moved to urban areas for employment. Rural incomes have risen dramatically and hundreds of millions of people have escaped poverty during this time. Growth in agriculture, non-farm employment and rural industry and the transformation of domestic and international markets have changed the face of rural China and are playing key roles in the nation's modernization.

While the new landscape has certain elements that are positive, there are still great challenges ahead. With the transition from planning in the rural economy mostly complete, China's main challenge has shifted to one of development. In China's new environment the main metric of success will be the extent to which the rural economy can become an integral part of the nation's push towards modernization. For China to successfully modernize, the nation's economy will have to experi-

ence a fundamental transformation—from rural to urban and from agriculture to industry and services.

The necessity of this shift is not only borne out by the development experience of every other high income country in the world (there are no middle or high income countries in the world that have more than 10 percent of their population engaged in agriculture), it is consistent with the nature of China's economy. Land holdings are so small and other resources are so scarce that farming cannot raise the incomes of most households. The gap between rural and urban residents remains wide. China's policy effort largely needs to establish linkages between rural and urban areas and encourage the shift out of agriculture. The most important policy measures are those that improve the quality of rural China's human and physical resources and infrastructure that will provide the skills and abilities to rural residents that seek to integrate themselves into the nation's industrializing and commercializing cities. Successful development policy, however, must also recognize that modernization is a long process that will depend on maintaining a healthy agriculture and rural economy.

Threat to US Economy and Security

Most of the conceivable threats that could emerge in the rural economy are indirect and would be realized in the event the rural economy would become destabilized and in turn affect the stability of the rest of the economy. Caused by relative deprivation, some observers believe that it is possible that rural residents could become disillusioned with the growth process and turn from productive activities to more destructive ones. In its most virulent form, farmers would turn to age-old practices of rebellion that could slow down agricultural production, weaken the confidence of domestic and foreign investors and divert national resources in an effort to suppress or deflate the movement. In its less violent form, rural discontent could appear in a rural population that increasingly believes it is becoming disenfranchised and become less cooperative with its leaders and responds by becoming less willing to follow the policy directives of the state that range from family planning to tax payments. The threat that could emerge out of the less violent scenario would primarily be indirect and operate through a mechanism that would begin to create a less stable environment that would be less conducive to investors, which could slow China's growth and trigger a series of problems (e.g., massive unemployment; financial collapse; fiscal weaknesses) that some argue are currently being masked by the expansion of the economy.

For a number of reasons, I find little evidence that rural China is anywhere near the point that it is becoming destabilized. I do realize that there is increasing coverage in the news media—both inside and outside of China—of expressions of discontent, idiosyncratic acts of violence against local leaders and village headmen, more organized protests and even riots. I also know that there still are egregious acts of corruption that inflame the passion of rural residents when such acts hurt individuals or communities directly or impinge on rural society's sense of injustice. It is also common knowledge that there are a number of chronic sources of irritation that are faced by villagers which are embedded in a number of institutions that are pervasive in rural China—for example, the lack of transparency in the way taxes are collected; the unevenness of the incidence of fees which are assessed for certain services; and the harsh ways penalties are sometimes imposed for policy violations.

But the statistical record would suggest that such realities, while every bit true, at least in the first decade of the 21st century might be at least partly offset by the progress that has been made in rural China in the past decade and the hope that rural families mostly have that the future will be even better than today. Above all, what should be noted, that despite gaps between rural and urban incomes that have widened during the past 20 years, almost all rural residents have higher incomes (rural income per capita rose almost 5 percent per annum since 1980) and significantly larger asset bases (for most households assets have grown faster than income during the 1990s) than when the reforms began 20 years ago. Per capita rural incomes have increased in all but 4 years since 1980s and even the incomes of the poorest decile (the poorest of China's poor) have increased at more than 2 percent per year (about the growth rate of the US economy since World War II). Rural incomes have grown from many sources: the adoption of new technology; switching crops and selling their produce into newly emerged markets; participation in sidelines, livestock and aquaculture activities; the shift of family labor into the off farm labor market; and starting up of micro-enterprises and other entrepreneurial activities. In short, rural households not only have more income, they are more highly diversified (more than 80 percent of households in rural China now have a job off the farm) and have more savings in the form of liquid and non-liquid assets (such as housing and durable goods). The optimism of rural society is perhaps best epitomized by the fact that rural China is one of the few parts of the world where the gap between rich and poor is narrowing.

mized by a survey conducted by two British economists in conjunction with the professional rural and urban enumeration teams from China's National Bureau of Statistics. When asked a number of questions designed to find out if people in rural and urban society believed they were better off now than in the past and believe that they will be better off in the future than they are now, a large majority of rural households responded that they were happy and were optimistic about the future.

Moreover, my own observations (and the observations of most other social scientists—both Chinese and foreign—who spend a lot of time *on the ground* in rural China) are in accord with the statistics. Anecdotes and isolated incidences of protest aside (which may, if anything, mean that rural China is opening up to the point that expression of discontent is allowed, even when from time to time it happens to turn violent), I would argue that currently the rural economy in a number of ways is more stable than the rest of the economy and that, *if a number of forthcoming challenges are met*, the rural economy will play a positive, stabilizing and productivity-enhancing role in the coming years. But, having spent many weeks (and sometimes months) each year for the past 15 years doing surveys and interviews in all different parts of rural China with survey teams from the Chinese Academy of Sciences and other academic research institutes, one can tell that life in rural China is getting better. Direct observation also shows that rural people, while having many complaints (which should not be equated with a tendency towards rebellion—just go to any farm meeting in US and get into a discussion with growers and suppliers about farm prices, government regulation, environmental laws, urban encroachment or any number of other issues and one can amass a large volume of complaints), also have many plans for the future. More than 40 million farm families began new business during the 1990s. The pace of emergence of such micro-firms is accelerating and firms are becoming more sophisticated, more capital intensive and producing more value added. People in all but the poorest, most remote villages are constantly planning their moves into the cities and more prosperous rural areas to find a wage-earning job. Currently there are more than 100 million migrants from rural areas in China's cities; most of them are from areas that have below-average incomes.

If this is the real picture of rural China, the real threat to the stability of China and through this the stability of the nation will only materialize if the process of rural development slows or stalls. In other words, the way to calculate if rural China will pose an economic or security threat to the US will be to assess if China can clearly state its rural policy objectives that will continue to allow the rural economy to flourish. And, of course, if China's leadership also can execute those policies successfully. While this may seem like a rosy picture of rural China, it should be taken with a note of caution. The policy package, while more or less known, do require a lot of resources and will depend on hard decisions of the leadership to reform institutions that will require fundamental restructuring. In the appendix attached to this brief, I review the strategic objectives that China needs to adopt and discuss some of the main challenges that will face the leaders that decide to take on the challenge of modernizing rural China.

Appendix

Rural Development in China: New Challenges in a New Landscape

Strategic Objectives

In their pursuit of rural development, policy makers face two fundamental and inter-dependent tasks:

First, the new era reformers are going to need to change the organization of government. A new framework for managing fiscal and other governmental matters is needed to meet the needs of the modernizing and increasingly market-oriented economy. The new institution also needs to instill a new ethic into government; officials need to change their role, becoming facilitators of economic growth and equity, not direct actors. Reformers also need to encourage the emergence of new partnerships with rural citizens. China needs to promote Farmer Professional Associations that can help in the process of development and assist government in taking care of vulnerable groups.

Second, a concentrated effort is still needed to improve the resource base of the rural economy. Despite the great progress of the past 50 years, many parts of the agricultural and rural sectors remain underdeveloped. There are 50 million more farmers in China than at the beginning of reform. Farms are fragmented, small and getting smaller. Other resources—water and forests—are just as scarce. Farm prices, at least for certain commodities, will almost certainly fall as the nation implements its WTO commitments. In such an environment the state and its partners

have much to do to help farmers increase their resource base. China's most abundant resource, its rural population, needs to be the target of a sustained drive to increase it human capital. Land, water and forests also require large investments and new institutional arrangements that can increase the productivity and incomes of households. Millions of people remain at or under the poverty line; most are poor farmers in remote, mountainous areas of China's western provinces. In short, if the government can create the new institutions to transform the government role in development, foster a new partnership with the people and improve the resource base, rural incomes can rise and the rural economy will be a force in China's modernization drive.

Rural Development Priorities

While a rural development plan has many components, we restrict our attention to three broad issues: (a) the nature of China's new economic landscape and measures to enhance it; (b) changes that are needed to improve rural government and its partnerships with the rural population; and (c) reforms and investments that can improve China's resources: labor, land, capital, water, forests and the environment of the poor.

Enhancing China's New Landscape

China's rural economy is on the brink of a new era. Much of the rural economy has successfully passed through the transition from a planned economy to one that is more market oriented, and most inputs in China's rural economy are now under the control of farm households. The government can lead China into a new era by redefining key food policy priorities; fostering markets; completing a set of grain marketing reforms; and continuing to integrate China into international markets.

Changing Priorities on Food Security: With such a large population and limited resources, China's leaders have always placed a high priority on food security and their efforts have made remarkable progress. Since 1983 China has been a net food exporter. Even if the nation completely liberalized all trade (which is beyond its current trade commitments), by 2020 rice and wheat will still be almost fully produced in China. Although the nation will be a net importer of maize and soybeans, by 2020 the export of vegetables, fruits and livestock and aquatic products will grow faster. With such a strong agricultural sector and the need to raise rural incomes, China should change the priority that it places on national grain self sufficiency. The recent policies to promote crop diversification are appropriate—as long as the planting decisions are made by the households themselves. Trade policies that artificially restrict grain imports also are not needed for national food security. Protectionist measures not only create international tensions, they cause inefficiencies and stifle structural change. Self sufficiency policies also slow down exports of labor-intensive, higher-valued products and reduce rural incomes. Other countries will keep their borders closed until they perceive that China is fulfilling its trade agreement promises. And, of course, even if at some future time the nation needs more grain, the land is still there and grain can be grown at any time.

Instead, a redefinition of food security is needed. In place of national food security, leaders should shift their attention to measures that promote *household food security* among China's poor. China's main food problem is one in which the poor are not always able to provide their family members with enough nutrition, health or education. Since the problems are essentially those targeted by China's poverty alleviation program, the current investment approach in poor areas that increases the productivity of the resource base and encourages diversification also will have the secondary effect of improving household food security. It is time that China makes this the new thrust of its food security policy.

Fostering Domestic Markets: Few accomplishments can rival the government's liberalizing of domestic markets over the past 20 years. The cost of shipping goods across China has fallen dramatically; the cost of shipping maize, rice and soybeans across the Northeast or down the Yangtze River is about equal to the cost of shipping grain down the Mississippi River in the US. Markets also have integrated rapidly; by 2002, prices between almost all pairs of markets across China—even those as distant from one another as Xian and Guangzhou or Heilongjiang and Shanghai—move consistently together for all major crops. Part of the improvement in domestic market integration is due to the construction of roads and improved communications. The improvements in China's market also are from rising competition; since the mid-1990s, thousands of private traders have entered the commodity markets and arbitrage away price differences between regions. An important exception to this positive trend, on the input side, is the seed market, as raised in section *Deepening Integration* below.

With such well-functioning domestic output markets, it is not surprising that the government is considering the implementation of a new set of grain policy reforms. Although such experimentation is preliminary it is vital. However, the grain reforms may be most successful if they adhere to certain principles. While limited payments to farmers may make sense to facilitate structural adjustment, international experience suggests that China will not benefit from providing direct payments to farmers. Therefore, before making such a commitment the Government needs to realize that in countries that once started, the farming population quickly began to believe that they are entitled to permanent support from the Government and often it is difficult to eliminate such program. *Instead, newly available resources should be channeled into public goods.* At the very most, payments should be made for a limited number of years. Payments should also be de-linked from production decisions. Careful attention also is needed to set up a system that ensures payments actually reach households. Targeting should be based on easily observable indicators (e.g., county-level cropping patterns and yields). The payment process also should be simple and use easy-to-observe criteria (e.g., provide payments to farmers based on their holdings of "responsibility land"). The program should be highly publicized so that farmers who are entitled to the payments can get them. China's agricultural policies are among the least distorted in the world. China should take pride in this and treat it as a valuable asset. To modernize, China does not need to make direct payments to farmers. By avoiding such payments, China will quickly become known as an efficient manager of its agriculture.

Deepening Integration Across the Border: Although there are concerns about the impact of an increasingly open economy on China's producers, there are many reasons to believe that the nation can benefit greatly by carrying out its WTO agreement with only a minimum negative impact.¹ Workers gain access to employment. Consumers benefit from lower prices. All producers benefit from lower fertilizer prices. Producers of rice, most vegetables and fruits, many livestock and aquatic products and other higher-valued, labor-intensive goods also will benefit if WTO leads to higher exports. While producers of barley, soybean and other edible oils were hurt by liberalization during the 1990s, most of the fall in the prices of these commodities had already taken place prior to the WTO agreement, so the agreement will have little effect. Only maize, cotton and wheat farmers will be adversely affected. However, because most farmers are highly diversified and are able to change products if prices fall, the overall cost will be small. The only groups that are likely to need support are poor maize, cotton and wheat producers in the Central and Western parts of the nation. According to China's own estimates, however, the annual loss due to WTO to these households (who are the most vulnerable of all households) only averages about RMB50 per household. A policy that compensates such households by RMB50 per year for the first several years after WTO (e.g., through a direct payment policy or a policy that eliminated tuition and school fees for households in these areas) would more than offset the negative consequences.

To get the most out of its trade policy, however, China needs to make complementary policy efforts. Chief among these is to allow farmers to have access to the lowest priced and most productive inputs and technologies from inside or outside China. The WTO agreement challenges China's farmers with competition in output markets from producers in the rest of the world. To compete, farmers need to have access to the same low-cost inputs and same high-quality technologies. There are many restrictions keeping seeds and other inputs from moving around the country. There also are barriers against the importation of inputs and technologies or investment by foreign technology firms. These should be sharply reduced and eventually eliminated in order to improve the income of farm households. According to international experience the entry of foreign seed and technology firms into the country could lead to both more competition and better transfer of technology.

Restructuring Rural Government and Partnerships

In trying to promote rural development in China's more market-oriented environment and to take advantage of the rural economy's dynamism, reformers need to reorganize government, especially the way it manages and monitors fiscal expenditures. Reformers also need to encourage the emergence of Farmer Professional Asso-

¹ China has promoted international trade, reducing average tariff rates, removing licensing requirements for many commodities, reducing the role of state trading and allowing thousands of enterprises to engage in the import and export of most goods. For example, average tariffs fell from more than 50 percent in 1991 to around 20 percent by the end of the 1990s. During this time, the total value of China's agricultural trade grew by about 6 percent annually and the growth of agricultural exports has exceeded that of imports.

ciations and other rural interest groups that can partner in the process of development.

Rural Fiscal Policy: The conduct of public finance is arguably one of China's biggest problems. The fiscal system, as designed, is out of date, generates inadequate revenues, poorly redistributes collected revenues and does not provide enough public goods. There are problems on the side of expenditure and revenue mandates at the sub-national level, as well as the way government transfers work. The problems with the provision of public goods and services for the agriculture economy, and more generally for rural development, are a subset of the larger problems with inter-government finance in China, and need to be addressed in the context of a broader public finance reform program.²

Examined from this point of view, the recent Tax-for-Fee Reforms, while well-intended, are unlikely to solve rural China's fiscal problems. Tax-for-Fee is an attempt to reduce the tax burden of farmers in a system that is already characterized by deficient revenue generation and public service spending at all levels. Studies have shown that not only are savings to farm households minimal (only around RMB30 per household), when collections fall, public services fall. Fiscal resources in poor deficit areas are already insufficient to meet the investment requirements. Over 70 percent of counties and townships are in chronic deficit. While there are many adverse consequences of the indiscriminate fee collection, the root cause may be the system's own design. Increased pressure at counties and townships to generate revenues to meet the system's un-funded mandates leads to excessive fee collection. The tax system, which remains heavily industry-based, can distort investment incentives and induce local governments to promote industrial development even in areas without a comparative advantage in manufacturing.

The reforms need to go beyond Tax-for-Fee Reform and consider the way expenditures are managed. The first step needs to be a review of the public goods and services that are needed in rural China. Realistic goals and priorities should be established for their provision. Each level of government needs to be handed clear responsibilities for the provision of a subset of the public goods. The resources needed to provide the public goods also need to be clearly defined. Leaders need to insure that sufficient resources are available to support the expenditures needed to meet their mandates. In the process, expenditures also need to be reorganized. Many tasks can be relegated to non-state entities. Many countries in the world have used alternative institutional arrangements to deliver key rural public goods without the direct involvement of the government. The rapid expansion of China's non-state sector, particularly in the area of services, means that such a restructuring of the government role could relieve some of the pressure on public finance, and possibly improve the quality of public services to support rural activity. Even though such reforms in China will be disrupting, they need to be implemented in a comprehensive way. To minimize the disruption for the nation as a whole, we believe rural fiscal reforms can begin with regional experimentation, once the nationwide crisis in inter-government finance is addressed.

Role of the State and Rural Partnerships: At the base of the rural public finance reforms lies a shift in the role of the state and development of new partnerships with citizen groups to carry out efficient and equitable growth. Although the Government moves out of the direct provision of many goods and services, it needs to be redirected to providing public goods, overcoming market failure and providing useful services that the private sector is unlikely to find profitable. To effect these changes, the main task of leaders is to comprehensively redefine the role of government and make explicit to various levels of governments, bureaus and individual leaders what they should and should not be doing. Also, as the government gets off direct production, it will be in a better position to create, implement and coordinate policies that involve conflicting goals. An example is the poverty alleviation policy to raise livestock (goats, sheep) in unsuitable areas resulting in serious environmental damage. Some sub-national governments have taken drastic but effective measures to manage natural resources while still helping the poor, but others need better guidance.

In a modern society which is dominated by markets and assets and information are mostly in the hands of private individuals and enterprises, the government needs partners to carry out its tasks. China should begin to encourage the development of truly independent Farmer Professional Associations (FPA) as well as other information networks, business support groups, marketing systems and credit cooperatives. Today such institutions are still very weak in China. While there are

²See accompanying World Bank Policy Note on *Public Finance Reform and Macroeconomic Management* for details on a proposed reform program., including an examination of the rural Tax-for-Fee pilot.

more than 100,000 farmer associations, their membership accounts for only about 4–5 percent of all farmers and the structure of most is still ill-defined.

Although the impetus to meet and act as a group must be from the farmers themselves, the government can create an environment in which FPA can thrive. *First*, leaders need to develop laws and regulations that promote and protect FPA. The legal status of groups needs to be clear. FPA need to have the ability to enter into contracts and take loans. Also beneficial would be regulations that enable farmers to organize themselves into locally-run credit cooperatives. FPA need the authority to be able to act for the members of their group as well as to be subject to well-designed regulations that protect the membership from the leadership, including the way in which the leadership is selected and monitored. *Second*, the experience of FPA in other countries has shown that even when a favorable legal and regulatory framework exists, an independent catalyst (that is, someone or group outside the government) is often needed to get FPA started, expand and perform better. While China has a number of FPA-promoting agencies, these institutions are controlled by the Government. Alternative models should be sought to create catalysts that are first and foremost responsive to the needs of farmers' and FPAs. The main role of such an advocacy organization is not to control FPA, but to facilitate their creation and provide information that allows its members to promote the interest of the association.

Investing in Rural China's Resources

Improving the productivity of resources should have a direct effect on the welfare of rural residents—by raising their incomes and making them less vulnerable to risk. Having a better resource base also will provide farmers with the means for making major decisions to move off the farm, migrate to the city or to make productive investments.

Preparing Labor for Migration Out of Rural Areas: Development is more than making the farming sector more productive. Access to off-farm jobs is the conduit through which occurs the shift of population from rural to urban occupations and from agriculture to industry and services. Although China has been late in starting the demographic transition, in recent years the status quo has changed faster in the off-farm sector than in any other. The beginning of the breakdown of many barriers in both rural and urban areas in the mid-1990s started an unprecedented, and perhaps irreversible, flow of labor to the cities. Despite the macroeconomic conditions of the late 1990s, the surge in off-farm employment not only continued after 1995, it accelerated. Almost 80 percent of rural households have at least one member in the off-farm sector. But the current labor flows are different from those in the past. For the first time rural workers show signs of specialization. Young workers—both men and women—are much less likely to work on the farm than older workers. In 2000, more than 75 percent of men and women between 16 and 25 worked in the off-farm sector, almost double the rate of 16-to-25 year olds in 1990. Almost all of them live away from home. They are not working in local enterprises. Most of them are moving increasingly far from home. Perhaps most important, many of the young people that work in off-farm jobs have never farmed. Firms with migrant workers have much higher efficiency and exporting firms employ a higher proportion of such workers than firms producing for the domestic market. Employment off the farm is the main way that rural residents increase their incomes and attenuate inequality among regions and sectors and is one of the most important determinants of poverty alleviation.

Despite the progress, the movement of workers off the farm has just begun and there are many barriers. Because the ability to find a job off the farm is inextricably tied up with human capital, investment in education and health will do more to facilitate off farm employment than any other policy. Since the beneficiaries of human capital investments are those outside the immediate rural community (i.e., the factory owners in industry and consumers of services in urban areas), international experience shows that the central government must take responsibility for investment in rural education and health. In recent decades, however, rural education and health have been left mostly on the shoulders of local governments and the poor households, although noteworthy efforts have been made in the past several years to increase the funding of rural schools, especially in poor areas. Complementary policies—in both the rural and urban sectors—also could help encourage the rise of off-farm employment and contribute to the increase in productivity that occurs when rural residents move to urban areas: investment in rural health; policies that encourage the expansion of rural industries; the relaxation of employment regulations in urban industries; easier access to urban housing, education and social services are some examples.

Raising Productivity on the Farm: China's research system has increased productivity for major staple crops at more than 2 percent annually during the reform era, a rate of growth that is considered healthy by international standards. More than 60 percent of China's productivity rise came from new technology. China's investments in biotechnology raised the productivity of cotton producers by nearly 25 percent and improved farmer health. However, the traditional system of research faces great challenges. Agricultural research in China, which is almost totally publicly funded, has always been focused primarily on the grain crops in irrigated areas. More than 80 percent of China's research budget was targeted at the major staple crops. With scarce financial resources, sub-national governments (which have accounted for most of China's agriculture research—a feature that is unique to China) have become reluctant to invest in research and extension. Despite recent increases, China still invests less than 0.5 percent of agricultural GDP in R&D, a level far below other countries. Unfortunately, few resources are targeted at the problems faced by either farmers in poor areas or to the basic research that can support new technologies to support a move into high-valued crops that are in demand in urban and export markets.

Given the small size of China's farms and likely post-WTO competition, the Government needs to keep the nation at the forefront of technological development in order to raise farmer incomes. Investment in agriculture technology needs to be raised sharply. Spending on agricultural research in China should be maintained at a level that is at least 1 percent of agricultural GDP (compared to the US, Canada and Australia, which regularly spend between 2–4 percent of agricultural GDP). The funds need to be better targeted. In the same way that the Government has reformed research in other sectors by focusing funds on the best scientists, promoting competitive grants and commercializing certain tasks (e.g., in the case of agriculture—the development of hybrid maize and certain horticultural crops can be performed by the private sector, as they are in most other countries), agricultural research reform is needed. While high potential projects should be supported, administrators need to set aside funds that will benefit farmers in poor areas. A policy that encourages the emergence of private research and seed firms is needed to take advantage of the ideas, capital and entrepreneurship of individuals.

China also needs to maintain its position as one of the global leaders in agricultural biotechnology. In the late 1990s China invested more in agricultural biotechnology research than all other developing countries combined. Its public spending on agricultural biotechnology was second only to the US. In recent years there has been increased support for research. While such investments have created a great deal of potential, the gains need to be realized. Large increases in productivity and health are possible when scientists are allowed to commercialize their products. This suggests that the government move forward with its commercialization of selected crops, such as *indica* rice, wheat and certain other crops. Recent research shows that consumers in China currently are accepting the new technologies; they have opinions that are more similar to US than European consumers. The promotion of new bio-technologies, however, delivers highest returns when products are channeled through an effective bio-safety system that allows commercialization only when they are safe, and keeps unapproved products off the markets. Therefore, investment is needed in the regulatory system that monitors the biotechnology program during research and after commercialization. As in the case of cotton, China has benefited greatly from the participation of foreign firms and farmers have gained high returns from using imported technology.

Encouraging Land Rental Markets: Secure property rights and well functioning land markets are considered important catalysts for economic growth, as they make investment worthwhile and facilitate transfers of land to the most efficient users. The efforts of the central and local governments over the past decade and the new Rural Land Contracting Law have solved most of China's land tenure security problems. Poor tenure security seems to have only minor effects now on either agricultural investment or production efficiencies. It is important, however, that central and sub-national governments make a strong and sustained effort to implement and enforce the new regulations. To do so, the central government needs to make repeated efforts to publicize through the various channels the salient clauses that affect farmer rights. Strong directives through both the Government and Party hierarchy need to convey the importance of the Law.

In addition to implementing the new Law, additional efforts—especially in the area of land registration—are needed to promote well functioning land rental markets. In an economy such as China's (scarce land; off-farm employment becoming the main source of future income for *most* farmers; Government unable to use price policy to inflate returns to land), households with opportunities off the farm need

to be able to rent their land out, and those that are left in the village need to be able to rent land in to be able to raise their incomes from farming.

Although rental transactions should occur between households that are seeking to improve their welfare, there is a role for Government in promoting the mobility of land among users. World Bank experience in other countries indicates that land registration can lead to increased rental market activity and lay a foundation for banks to begin to use land for collateral for loans. In general, registration gives additional protection to farmers by improving transparency in different types of land transactions. Moreover, if it is administered at a high enough level, farmers across large regions can be provided uniform certificates of documentation and this will broaden the market and make registration more valuable. For these reasons, a provincial level pilot for Land Use Rights Registration may be tried. It has been shown in other countries that land registration is one of the World Bank's most productive and welcome loan packages (in terms of its impacts on raising the productivity of the agricultural economy) that is done with a minimum burden to the Government (land registration loans are largely self-financing, since registration fees paid by farmers are usually sufficient to pay back the entire amount of the loan).

Experimenting with Rural Finance: The development of rural finance is a pressing issue. The effective implementation of many other policies (e.g., those that promote migration) and investments (e.g., those that encourage the creation of new technologies) rely on an effective rural financial system. Low levels of financial intermediation have affected the rural economy. According to one study, RMB1.3 trillion (in 2000 prices) of savings have moved from agriculture to industry between 1980 and 2000; RMB2.3 trillion flowed from the rural to urban economy. While this direction of the flow is to be expected during development, the size of the flow is worrisome.

International best practices suggest that the goal of rural financial reform in China should be to create a competitive, independent (from local government officials), market-driven and sound rural financial sector in which there is separation of commercial and policy lending, flexible interest rates and a wide variety of financial instruments (e.g., both short and longer term loans and deposits) available to borrowers and savers. The Government should begin to launch experiments to move in that direction as soon as possible. Experiments can be regional, focused on state-run banks and rural credit cooperatives (RCC) and designed with true experimentation in mind. Some of the early experiments could be done in the coastal areas since this is where the demand for credit is highest and the institutional environment in the banking sector most ready to change. The experiments need to examine a number of dimensions of the banking reforms, including: allowing interest rates (on loans; not deposits) to float in some areas, while restricting them in others; allowing the entry of other rural financial institutions, including private banks, in some areas and not in others; and providing deposit insurance in some and not in others. The key to the reform, however, is that the governance of the experimental banks needs to mimic those of a truly commercial bank. This can be only done if those that lead the experiment take full control of the banks in the experiment and seek to protect the capital of the bank, make the assets grow and seek to earn sustainable profits. In any experiment, banks need to be free from interference from local officials.

Similar experiments can be done in the central regions of China, although differences in the economic environment and status of the portfolios will necessitate that the experiments will vary somewhat. Specifically, it is possible that in some areas, because the economy is growing slower, there will be less interest by private banks to enter. The existing financial institutions in central China, mostly RCC (and ABC in the areas in which they have not withdrawn) are also frequently burdened with many non performing loans. In such an environment—that is in one in which there are only heavily indebted state-run financial institutions that will not face competition from private bank entry—it is possible that a program of reform like that being advocated for coastal areas would fail. The danger is that even if managers were given better incentives and more authority to increase deposits and make loans, they would act in the same way as they did during the mid-1990s financial liberalization period (e.g., they could be inclined to continue to give loans for non-commercial purposes and not be overly concerned about making loans that could not be paid back).

To offset this tendency, reforms in the central region would need several additional components. *First*, the experiment office would likely need to allocate more human resources to monitoring the actions of the banks in the experimental area. *Second*, a package of incentives needs to be offered to local governments (especially in counties in which RCC are part of the pilot projects) that would make them (the *de facto* "owners" of the local RCC and the entity most directly responsible for its

bad debts) encourage the local financial institutions to begin to operate as commercial concerns. Possible incentives include partial debt relief or promises of recapitalization. *Finally*, the experiments should encourage the emergence of non-formal financial institutions (such as, micro-credit programs and lending and credit programs run through new farming associations or other rural-based cooperatives). Some experimental areas may want to try to experiment with turning RCC into cooperatives or some other quasi-commercialized financial institution.

While the main experiments in market-oriented, rural financial reforms may be most instructive if carried out in the coastal and central areas, there is room for experimenting in poorer areas, where one of the main goals should be to establish a clear separation of commercial lending from policy lending. This can be done by moving out all policy lending from the ABCs and other state-owned commercial banks and moving them to the Agricultural Development Bank of China (ADB). Although the ADBC would need to link itself with a network of local outlets (e.g., contracting with RCC to implement their lending programs), the program design, flow and management of funds and monitoring and evaluation could be clearly centered in an institution that has no commercial interests.

Facing the Challenges of Water Management: Water shortages pose a serious barrier to growth, are limiting efforts to alleviate poverty, and are becoming a major source of environmental problems. So far, no option has proved very successful in combating the problem of increasing water shortages. Unfortunately, traditional policies either no longer work (e.g., investing in increasing the supply of water—most of the water in northern China is already being used) or do not lead to real water savings (e.g., the promotion of technologies such as sprinklers). Such strategies are unlikely to solve China's water shortages since they do not lead to real water savings. Even with South to North transfer projects, there will still not be enough water to solve the crisis.

With the failure and infeasibility of traditional methods, there is need to turn to more ambitious water policies. While a more complete statement of our recommendations can be found in other sources (e.g., a publications by the World Bank, *China: Water Resources Assistance Strategy*, 2002), we summarize here the steps that the Government must take in order to begin to manage north China's water resources. *First*, water savings in irrigated agriculture need to focus on reducing the water consumed per unit of crop production. This requires an integrated approach of improvements in irrigation technology, agronomic practices, and farm water management. *Second*, water management agencies need more authority to implement the difficult measures that are needed. *Third*, to achieve true water savings while avoiding inequitable outcomes, a system of water rights for both surface and ground water is needed, with rights extending to individuals that live in specific areas and the total amount of the rights limited to water availability after taking into account the environment and other needs. *Fourth*, after water rights are established, China needs to begin the investments and management shifts that will allow for volumetric pricing and regulation of water. *Finally*, with the institutions and facilities in place to implement a system of water rights and charge for water volumetrically, the nation can begin to move forward to raise water prices, promote new water saving technologies (ones that will lead to true water savings, such as, reduced-irrigation cultivation practices for wheat) and reform management institutions in order to achieve cropping intensity levels and cropping patterns, as well as municipal and industrial use levels that will be sustainable.

The efforts on the conservation side must be matched on the pollution abatement side in order to stop the mounting, and often irreversible, damage to China's water resources. Water scarcity is more critical when limited water resources become unusable because of water quality deterioration. In sum, it is not going to be easy to make the fundamental shifts, but of all the areas of resource management, getting water policy right may be the most important.

Managing Forests and Grasslands: Actions to improve the environment in the middle and upper reaches of China's main river basins are implemented through two directives. The National Forest Protection Plan (NFPP) banned logging in most of China's . A Slope Land Conversion Program (SLCP) began paying farmers in cash and grain for converting millions of hectares of fragile and erosion-prone cultivated land into forests and grassland. While the full benefits and costs of NFPP and SLCP will not be known for decades, there are a number of policy actions that should be taken to enhance benefits and minimize adverse consequences. *First*, the program has been successful in setting aside millions of hectares of land—much of it fragile and sloped land—and it has provided farmers with compensation that has more than offset their lost earnings. Most rural households support the current arrangements, although they signal that if the payments cease, they will be forced to begin to cultivate the slope lands again. Therefore, there is a critical need to diligently

follow through with official promises: to make full, timely payments directly to households and to provide farmers with high quality, appropriate forest and grassland technologies, giving households as much choice as possible. The programs are very generous, so there may be scope for some economizing later. The average payment to farmers in China (in PPP terms) is more than 10 times the average payment to farmers in the US Conservation Land Retirement Program, on an area basis.

With regard to the NFPP, as the logging ban nears its fifth anniversary, measures are needed to address some of the serious costs from its implementation. Although the employees of the state forest farms have been provided with unemployment insurance payments, there are many groups of people who have been affected by the ban but not compensated. With the decline of logging output, the tax revenues of many counties have plummeted and the services funded by them have been reduced or eliminated. Rural residents in many collective forests have suffered serious negative and uncompensated income shocks. While the strict NFPP regulations may have been needed to initiate a new era of natural forest management, today policy makers need to foster a more integrated forest management strategy by promoting sustainable use of the forestry resources.

Policies to address degraded grasslands have also been under active implementation.³ However, a coherent strategy for developing pastoral areas and for addressing grassland degradation is still lacking, caught between policy objectives for livestock sector development and sustainable management of grassland ecosystems. As a result, grassland management programs remain almost entirely focused on “technical fixes” such as fencing, with less attention paid to social aspects and economic costs and benefits. Because of the multifaceted dimension of the problem, actions will need to be taken on several levels. Effective solutions are anticipated to be institutional, organizational and behavioral, as opposed to technical. Implementation of measures, including monitoring and enforcement requires community level participation. The required measures include: (i) improved information on the condition of grasslands; (ii) refined models of grassland ecology and better integration of interdisciplinary approaches to design appropriate livestock management systems; (iii) articulation of the links between the biodiversity conservation and watershed values of grasslands and the economic benefits of development of pastoral areas; (iv) faster production and transfer of appropriate new technologies for grassland and livestock production; (v) improved market accessibility so that livestock off-take from the grasslands can be increased at critical times; and (vi) refined grassland tenure arrangements with emphasis on exploiting pastoralists’ traditional land tenure, assigning more authority to village-based institutions, and exploring alternative contracting methods, including community based grassland management.

Policy Priorities for Rural Development that will Lessen the Emergence of Rural China as a Threat to US Security

This policy note has raised a number of key policy efforts that China needs to make to allow its rural economy to continue to grow. Their implementation should enhance China’s economic environment for rural development, help restructure government and create new partners to share the responsibilities for development, and improve the productivity of rural China’s resource base.

How should one gauge progress? While all policies are important to some degree or another, there are some, that I believe are more important than others. In other words, to assess China’s progress in fostering the development of its rural economy, one should follow progress in the following priorities areas:

- (i) In implementing its new rural policy agenda, the two most important, but complicated, problems facing China’s rural economy are getting the fiscal and financial systems right.
- (ii) While it may seem that progress in domestic market formation and trade liberalization make reforms in these areas less urgent (because of past progress), by pressing forward in these areas—e.g., by eliminating any remaining interregional barriers, liberalizing the imports and investments of seed and agricultural technology—China has a chance to make itself special among the nation’s of the world.
- (iii) With well functioning markets that transmit clear signals to producers and consumers, the investments in public goods and services will produce even greater returns. Reforms are furthest along in the areas of liberalization of labor and land.

³About 35 percent of grassland is considered to be moderately or severely degraded.

- Encourage the development of truly independent Farmer Professional Associations. To do so, the most pressing immediate needs are the creation of laws and regulations and advocacy groups that will promote the FPA.
- Increase allocations (to at least 1 percent of agricultural gross domestic product) and implement research reform in agriculture (inclusive of poor regions).
- Investments in education and regulations that break down barriers to labor movement will encourage off farm employment, the main conduit through which most rural residents will ultimately pass through to reach a modern life.
- If China rigorously implements the land laws and begins provincial Land Use Certification programs, tenure security will be improved and farmers will be more willing to rent their land when the opportunity arises.
- The problems of water are probably the most critical since they threaten long-run, sustained development in certain regions. Innovative experiments for water rights, volumetric pricing and other technology-based programs that can promote true water savings need to begin soon to find ways to rationally, efficiently and equitably manage the nation's water supply.

Panel I: Discussion, Questions and Answers

Vice Chairman D'AMATO. Thank you very much, Dr. Rozelle.

I'll call on Commissioners to question one or more of the witnesses. And try and keep the question and answer to five minutes. Five minutes—we have quite a number of Commissioners. Commissioner Robinson.

Chairman ROBINSON. Thank you, Vice Chairman D'Amato.

I must say, Dr. Rozelle, that was a fascinating presentation. We haven't heard a great deal of testimony on rural China, and we don't have witnesses before us that have spent a great amount of time there. And that's led to a lot of speculation of the type that you've talked about concerning how is this wealth and—disparity and wealth and social dynamic ultimately going to play out. I was fascinated by the clusters, I must say, and also the level of relative prosperity and contentment and—but I obviously buy the fact that this is still an untested—or the trial—or the-jury-is-still-out phenomena. But I'm very interested, of course, to see how the story progresses. And we'd like to keep in touch with you on it because it's been a real resource for us. And we have to understand the rural economy and the go-west policy that's akin to it.

I actually had a question for Dr. Naughton, as well. That was not a question, but an observation.

The breakdown between state sector and private sector, even though I think the term private sector is still somewhat loosely defined, is now 50/50 or 60/40 or overall?

Dr. NAUGHTON. In industry, say?

Chairman ROBINSON. In the country.

Dr. NAUGHTON. Much more private than state sector because, first of all, all the farmers are private.

Chairman ROBINSON. Right.

Dr. NAUGHTON. Almost all the rural industry has been privatized, as Professor Rozelle could tell you much more than I could about that. And in the cities, the state sector is now down to about a quarter of output and labor force.

Chairman ROBINSON. A quarter.

Dr. NAUGHTON. Yes.

Chairman ROBINSON. And it was 50/50 relatively a short time ago?

Dr. NAUGHTON. Yes. About, say, four or five years ago.

Chairman ROBINSON. You had mentioned that there's a 45 percent reduction in the state sector over the past five years.

And yet, if you look at the U.S. capital markets and the enterprises that China sends to the New York Stock Exchange and NASDAQ, you'll take note of the fact that that's over 90 percent.

Dr. NAUGHTON. Right.

Chairman ROBINSON. And as of two years ago it was a hundred percent. And that's interesting to me as a financial type. I—you know, it occurred to me that there's a hesitancy on the part of Beijing here in evidence, that there is even a, I think, a question of fundamental trust. But you would perhaps have a better handle on why you don't see this dramatic trend line expressed in such a key area of activity. Because I think we all understand that they come—they cap markets to raise funds in a particular way, selling off only 10 or 15 percent of big state-owned enterprises to raise multi-billion dollars.

It's pragmatic and it's successful, but it doesn't really reflect the dynamic. And I'm wondering if you had any observations on that.

Dr. NAUGHTON. I completely agree with you. I mean, that the process by which state firms have been listed on stock markets has been distorted and in some cases corrupt and something of a sham. I think in a sense the markets have voted that way themselves.

The Chinese stock market—look what's happened in the Chinese stock market. It's at the same place—actually, slightly lower than it was three years ago.

And here we are talking about the exploding Chinese economy, all these changes, the dramatic growth. Why? Because Chinese asset holders recognize that these are not good investments. These are state firms that have been structured in a special way in order to allow them to list and get some revenues from some of those managers.

Luckily, that's not where the action is in general. There are a few—you might find 40 firms on the Shanghai stock market that are quite good and 200 that are sort of Potemkin villages.

Chairman ROBINSON. Thank you.

Vice Chairman D'AMATO. Mr. Wortzel.

Commissioner WORTZEL. I've got a few short questions. So I'll try and give you as much time for each of you to answer as I can. Dr. Naughton, you were somewhat critical of the large-scale state plan on technology. And I think you're talking about the March 1986 plan in that the firms involved just didn't pan out. But it seems to me that when we listen to the testimony, as a strategy of mastering whole areas of high technology for the nation, it's been highly successful. We're hearing—later in biotechnology, but in agriculture, certainly you're talking about chips and things like that. So would you evaluate the overall strategy as successful and why? Now, I have a specific second question of you that you may want to defer to one of the panelists later in the afternoon.

I have been trying to get my arms around the idea of what difference it makes from a security standpoint if China can manufacture 0.25 versus 0.18 versus 0.09-micron chips. What does that let you do in a weapon? Does it really threaten us?

Dr. Fung, I was fascinated by your analogy of the German luxury car and the Italian sports car; but from what Dr. Naughton said

about the creation of standards sort of artificially by the Chinese government as a protectionist measure, it seems to me that your analogy of let's not worry about it, it will all even out kind of breaks down if we can't somehow stop that sort of protectionism or address that sort of protectionism.

And, Dr. Rozelle, I'm going to take you way off base. You, in your testimony—your written testimony talked about the real problems of water management. Orally, you didn't mention it., but what struck me are some of the large-scale water management plans in China or strategies that would seek to divert whole river systems—like the Irrawaddy, the Brahmaputra or the Mekong—that affects loads of countries downstream, some of which have been hostile to China. Do you see those panning out? And if so, do you see a larger, regional security destabilization from that sort of thing? Thank you.

Dr. NAUGHTON. I guess I will go quickly. I think it's very hard to evaluate Chinese technology policy overall because it's big. It's an elephant, and it depends on what part of the elephant we touch.

Clearly, China's done, I think, a very good job of sort of pouring resources into human capital without really knowing what they're going to get out of it.

So the number of people with some college education has gone from less than 1 percent to about 5 percent of the labor force, which for China, that's huge. It's a small fraction of the U.S., but it's great progress. But when we look at specific industrial policies—let's say industrial circuits. They integrated circuits. They spent at least 2 1/2, \$3 billion in the '80s and early '90s importing production equipment into IC fabs for state firms.

Where are those fabs now? The only one that's still playing a role has essentially gone into receivership and been taken over by a Taiwan firm. And the key players that we're talking about, that we're concerned about, they're all basically Taiwan firms. And the expertise and the know-how comes from Taiwan. So I would call that a failure for the industrial policy even though there's something real happening and obviously they found enough skilled Chinese workers to make it work.

As far as that line with the question, I'm going to have to pass to others who know a lot more than me about the security implication.

Dr. FUNG. For the government intervention by the Chinese government to distort whatever market-based sort of model of the global supplied chain obviously is something that I think the U.S. Government should make sure that doesn't happen.

So while it is an efficiency response by U.S. multinationals, the builder is very highly productive global supply chain involving China, we do, of course, have to watch out that the Chinese government does not distort that sort of position.

Dr. ROZELLE. Yes. It's a very complicated question, the water management question, both groundwater management in North China where it's particularly important and then the falling aquifers and then the ability to transfer water from south to north. I think from my reading of it, they're totally committed now to building two, maybe three aqueduct systems, investing \$50 billion. That's two, three gorges, dams, to take water from the Yangtze and

take it to North China. It's going to increase water by 15 percent, which is a lot of water. And it will probably solve their urban water consumption needs.

Agriculture is going to be very hard hit. It's probably very good news for the wheat producers of the world because I think that's what's going to happen is they're going to go out of wheat. They're going to go into single crop, maize or corn, and that we'll see a lot more wheat—it's going to be 10 or 15 years from now—finally go into China. I think the ideas of damming the Irrawaddy and damming the Brahmaputra, you know, are very expensive. The benefits are very low. They aren't going to get the water up to North China where they need it. There's some flood control—they can—

If they can't negotiate their way—the Southeast Asian countries and the South Asian countries and China can't negotiate their way out of that one, then we have a lot bigger problems than damming those rivers. So I think it's a fascinating question.

Vice Chairman D'AMATO. Thank you very much. Mr. Becker.

Commissioner BECKER. Thank you very much. I listened with a great degree of intensity to your testimony. And I've read most of the written information that we got in advance. I have no doubt that China has benefited greatly from the foreign direct investment from American corporations moving all or part of their operations to China.

And I have no doubt that the multinationals have benefited greatly as a result of these astronomical profits when they export back into the United States. But when you look at this, I wonder if we're getting a complete picture. You haven't talked about the comparative advantage that China offers these firms to come to China, which is really an endless supply of cheap, exploited, repressed labor. And with the government that we have in China, that's likely to stay that way. That's not going to change. That's the comparative advantage that they're offering. That's the comparative advantage that they're keeping. Picking up on what Commissioner Mulloy of what's happening here in the United States, we have an astronomical trade deficit that continues to rise. It's \$125 billion for China alone, which kind of puts the trading relationship in some kind of perspective. Millions of industrial jobs have been lost, factories sitting there, rusting hulks. The communities have lost their tax base. And unemployed workers don't contribute to the social stability of this country. They can't pay for the Social Security, the Medicare and all the myriad of things that we demand in this society.

I guess my question is, where is this going to end? What do you see as the future? You made a statement about what is China going to get out of it?

My question is, what are we going to get out of it? What do you see for America? What do you see for small businesses and workers and the communities facing this? If we continue on with no change just like we are now, what's your vision of America in the future?

Dr. NAUGHTON. Well, that's a really a hard question. And I don't, you know, want for a minute to deny the fact that American workers, and especially manual workers, have suffered enormous impact from globalization in general and from the reintegration of China in particular. It's not a comfortable position to be a manual worker

competing with not only a billion people in China, but, almost a billion in India and Mexico and Brazil. And the costs are real, and the adjustment costs are real.

When you asked what my vision is for the long run, I think in the long run the successful economies of the world don't threaten us nearly so much as the unsuccessful ones. It's not China that has a huge trade surplus overall. It's the U.S. who has a huge trade deficit. China has a modest surplus. It probably should have a bigger deficit, I agree. There's some adjustment issues. But the overall deficit problem is one of our economic policy and not, I think, one of Chinese export policy. As China succeeds, it becomes a bigger market. It contributes intellectual wealth to the world. There are new forms of division of labor that emerge.

So my vision is of a global economy in which the most successful economies stimulate each other and provide benefits to each other. I don't mean to downplay the costs of that process.

Dr. FUNG. The dislocation costs, obviously huge, particularly in low-cost, low-wage industries in the United States. So I think policymakers, as Dean Cowhey pointed out, probably have to come up with innovative solutions to compensate the losers of globalization. But at the same time it seems that the U.S. strength and vitality really is—it lies in a situation where we compete fairly and we compete globally.

I think history with the Japanese—I used to work in the U.S. Government when we had a lot of trade issues with Japan. And there were a lot of people saying Japan is going to overtake the United States in all areas, auto and all that. I never believed that, partly because that I thought, how can such an open economy that attracts talent from all over the world, how can they lose? I can't imagine that we'll go the way of other economies.

Now, it doesn't mean that we don't need some kind of policies sometimes to cushion us, give us some breathing room and also to compensate some of the people who are really, really hard hit, and we need to really take care of them. But at the same time I'm not sure what is a good strategy for the welfare of our country to sort of shut down this process of interacting with other economies.

Dr. ROZELLE. I'll try to keep it very short.

I was thinking when you asked Dr. Cowhey about what you would tell leadership of the U.S. what they should do. And I'm going to talk about agriculture because I think that they've touched the main points there.

Number one, I would find out—I think China is a tremendous potential market for our farm economy and for the manufacturer of inputs and technology. But we aren't even close to tapping it yet.

Number one, we don't even know what's happening over there. The Australian government outspends the U.S. Government on research on China by a magnitude or so. There's a big black box when it comes over there to fare what we should be doing.

Two, we definitely should be working on opening up markets. The role of the government is to identify the nontariff barriers that are fiction and open them up and to continue to work with China on future trade agreements and WTO-type agreements. I think China will be an ally to the U.S. in future WTO talks and its positive role in agriculture can help get the talks started or any other

Free Trade Agreement or free trade type of agreements that are going on. Three, we need to invest in industries here in using our comparative advantage, continue to invest in research and infrastructure. There are huge markets that are going to be tapped there. The U.S. farm sector can take advantage of them.

And, finally, there is going to be structural adjustment here; that I think the programs that we have in place probably are sufficient to help that structure adjustment. They may need more in agriculture.

Commissioner BECKER. Thank you. I want to offer two comments, which in the interest of time you may not even want to comment on. But we had a field hearing in South Carolina centered largely around the textile industry. We've lost hundreds of thousands of textile jobs to China. And other low wage or developing countries throughout the world have lost the textile industry to China. The only thing that has kept things a little bit stable is the multifiber agreement that was negotiated.

Now, there's no doubt in the textile industry's mind or the workers that once that expires, it's all gone. And the United States will lose another 400,000 workers in the—is it 400,000 or 4,000?

Commissioner BECKER. 400,000 in the United States. And they predict millions throughout the lesser-developed countries that will be gone.

I don't know a solution for that. Can removing the tariffs and opening the barriers for trade with China—I want to give you another example. General Motors built a Buick division in Shanghai. A Buick made in Shanghai gets the company \$10,000 profit. A Buick made in Detroit, the same Buick, same design, same everything, they get \$1,000. Now, we've lost thousands of jobs in Mexico. We lost 75,000 General Motors jobs to Mexico under NAFTA. The automobile industry, which is one of the most important in the United States affecting so many ancillary jobs—is under attack. The original parts and aftermarket parts are being developed in China to supply the U.S. market and the Chinese market. I just want you to think about what's at risk here and how you counter that. You don't have to comment on it. I just wanted to get it out into the record.

Vice Chairman D'AMATO. Let me move on. Commissioner Dreyer.

Commissioner DREYER. Thank you. This is for any and all of you, but it is prompted by something that Professor Rozelle said. You were talking about being unpopular in the state of California because you have pointed out that the Chinese are able to produce certain agricultural commodities, such as apples, at a lesser price than the U.S. I have been watching with somewhat dismay the disappearance of the family farm in the United States because it cannot compete with agribusiness.

And I am wondering what effect this would have—a similar effect, as it really has to, in the Chinese agricultural scene, in that large plantations, I know you don't have apple plantations—but the plantation economy produces better product at lower cost.

It would seem to me that the Chinese family farm also is being threatened by this same phenomenon we see in the United States, but that in Chinese context, because of the millennia long attachment to family land and ancestral graves and, also, of course, the

original ideology of the Communist party, which is to champion the interests of the workers and the peasants, would have on this. There don't seem to be enough jobs in the urban economy to absorb permanently, this exodus from the rural areas.

I, of course, read, as you do more so than I do, about the sannong wenti, the so-called three problems of agriculture, and the near paranoia of the leadership about instability in the countryside. And I wonder if you see any connection or prognosis for the future in there.

Dr. ROZELLE. Okay. You know, first of all, in some of the work that's been done by the USDA on China's entry into Free Trade Agreements and emergence as an agriculture trade shows that actually the U.S. benefits a lot on an aggregate over the long run.

Even today, the heartland—Illinois, Indiana, Iowa—from the rise of the price of soybeans versus other grains which are completely connected with China's massive imports, that's been the flip side of it, is that's invigorated those economies and then all the linkages to the rest of those, you know. And so you're a soybean farmer, you're okay. You're a textile worker in South Carolina and you aren't.

You're right, though, when you're saying that farmers in the U.S. fear this sort of supermarketization and corporatization of agriculture.

Commissioner DREYER. I actually wasn't worried about the U.S. farmer in this question. It's China.

Dr. ROZELLE. What I was going to say is this is happening in China as we speak.

Five years ago 12 percent of Chinese food was purchased in supermarkets. Now it's up to 40 percent. Within ten years everybody's going to be shopping at Wal-Mart and Ahold and Carforre and the Chinese derivatives thereof. And it's going to have a very big impact on the agricultural sector. We don't know what it is. I actually don't think the family farm in China is going to be directly threatened. They aren't going to be replaced by plantations. What's going to happen is their returns are going to go down as the same buying practices—that's what I was referring to the U.S.—the same buying practices that they use here that cut costs and cut margins and do shelf-space pricing are going to be, you know, used and probably perfected, you know, in overseas markets. So this is something that we need to watch. Right now markets are very robust and farmers get hurt and get helped as prices go up and down. And so it's something to watch. And I think that the agricultural lead—the leadership in China, especially Wan Jabau, who is very, I think, personally concerned but also worried from a political economy standpoint, that's why we—I'm watching very closely.

Are we at a turning point in Chinese politics, when there's a reversal of flows of resources from extracting from agriculture, are they going to put it back? So we have to watch that.

Commissioner DREYER. Thank you.

Vice Chairman D'AMATO. Thank you very much. Commissioner Reinsch.

Commissioner REINSCH. Thank you. Mr. Naughton, I was struck by the exchange with you and Mr. Becker. It seems to me you're

dealing with an important question, which is what, if anything, do we do to help make sure that the Chinese become a benign engine of economic growth, which would improve their prosperity, their jobs and promote stability in the region, and thereby help us for a lot of reasons.

It seems to me you're saying—and I agree with you—that one way to facilitate that is to maintain engagement, to maintain linkages, to maintain building an economic relationship. And I agree with you about that. I guess my question goes back to your analysis of the bilateral trade relationship, which I thought was incisive. I would like you to do two things. One is to comment a little bit on the stability of the triangle and what you see happening over the next few years in its evolution. And, second, relate that, if you will, to whether or not there are likely to be any sort of macroeconomic consequences of the enormous U.S. total deficit and things that might happen as a result of that that would affect the bilateral Chinese relationship.

Dr. NAUGHTON. Thank you for your confidence in me in asking those questions, which are extremely difficult.

Commissioner REINSCH. Sorry?

Dr. NAUGHTON. I think the basis of the triangular relationship, I think, is actually fairly solid. The Taiwan firms and increasingly Korean and Japanese firms are getting back into the game in a big way.

And there's a distribution of intellectual resources among the different parties that is reasonably stable even though we're all upgrading at the same time.

Taiwan has formidable technological resources. And the business community of Taiwan, I think, has made a pretty firm commitment to the mainland, sort of exemplified by Taiwan semiconductor that for years was hesitant and skeptical and then now has gone ahead and started to construct a plant in Shanghai. So I think in that sense the triangular relationships fairly stable. Japan and Korea are coming back in. This picture of Japan that a number of us sketched of a country that lost out because it didn't engage fully enough was very accurate for Japan in the 1990s. It may be changing rapidly. And so we might be seeing in a sense more—deeper interaction, more competition, more complicated division of labor. But I think the fundamentals are reasonably sound.

The overall U.S. deficit, perhaps Professor Hanson can also address that later this morning. But it depends on whether the U.S. retains the technological and financial leadership to attract investment from throughout the world. As long as investment capital is pouring into the United States, which it seems to be—and some of that is from the Chinese Central Bank—then we can be in a sustainable deficit; not at the levels we're at today, I don't think.

Commissioner REINSCH. Thank you. If I've got time, let me come back to you. First I wanted to ask Dr. Rozelle a question. Can you say a few words about the quality or the role of infrastructure and particularly transportation in the agricultural sector.

Dr. ROZELLE. Yes. That's a very important part of sort of this really emergence of a market-based agricultural economy and their ability to compete and their ability to buy and use world products, including U.S. goods, as they come in.

Basically what you have is coming from a legacy of socialism and Maoism where roads weren't built purposely to divide the economy. China now has responded on the other extreme, and they're building roads now faster than the Eisenhower Administration built roads in the 1950s in the U.S.

The road infrastructure that's going in, you know, across China is unbelievable. It changes triply for me, which is, you know, one or two trips a year. One year you're on a small back road and the next year you're on a four-lane freeway. Now, I've heard different discussions about how good these roads are, how sustainable they are, are they poorly constructed and everything like that. And I don't know anything about that. But the road web and infrastructure is amazing.

I have a paper where I show cross-sectioned. So take in a given one-week period prices that go from Shanghai all the way up to Chengdu inland. So take across there.

And then I compare them to prices in the United States from New Orleans, up to St. Paul. And you look at those two, and they're sloped exactly the same.

China ships corn around at the same price and cost as the U.S. ships corn around its country now.

And when a price moves in Heilongjiang in the northeast, in Maine we see prices in New Orleans or prices in St. Louis move at the same time. So there's this increasing integration done by these roads.

Commissioner REINSCH. That's really interesting. Maybe you can share that paper with us if you don't mind.

Vice Chairman D'AMATO. We're going to have to move on.

Commissioner REINSCH. I'm out of time, but I'll catch you on another occasion. Thank you.

Vice Chairman D'AMATO. Commissioner Mulloy, we have to be relatively rapid. We're running pretty late.

Commissioner MULLOY. Yes. Dr. Naughton, Commissioner Becker made the point about the loss of jobs. And you were referring to the manual workers, the blue-collar workers. I think we've got to look at this in a larger political context.

You know the present chairman of the President's Council of Economic Advisors, Gary Mankiw, released a report the other day, and he said the outsourcing of white-collar jobs, which is going on at a very fast pace, is good for our country because it makes us more competitive globally. I don't know whether you saw the political reaction to that, but I'm looking in the San Diego Union Tribune dated February 12th, today.

The Republican speaker of the House, Mr. Hastert, has attacked Mr. Mankiw and said, this is lunacy to be talking about just letting these jobs go. The United States is the largest debtor nation in the world by far. We have the largest current account deficit in history. \$500 billion this year, and that's adding to our international debt. Even the IMF is worried about these irresponsible economic policies, as they would, I think, call them. As Commissioner Becker noted, this losses of jobs isn't just jobs. These are our tax base. When you lose jobs, you don't have taxes to do other things to improve your communities, improve your life and to improve even research and development.

Now, Dr. Fung on pages 7 and 8 of his testimony says, don't worry about this. He says, Germany and France traded with each other, and they both did pretty well. But what Paul Craig Roberts and Senator Schumer is saying is, this is quite different when you're dealing with economies which are quite different in terms of their economic condition.

France and Germany had similar social, labor, environmental, and other standards. Now we're engaged in trade with economies, which don't have labor standards, don't have environmental standards, and it makes it economically efficient for maybe a company to move jobs because they don't face those costs in these other countries. So what may be good for the American high-tech industry may not be good for the American economy.

I think if we want to remain engaged in this global economy, then we got to be thinking about what is it—how do we deal with these competitive problems?

Clearly, massive trade deficits are signals that the United States is not competitive? What do we need to do?

Dr. Cowhey said research and development. But I think you can help us by saying, okay. Here's the problem, and here are some solutions to the problem. And if you could help us along those lines, I think it would be enormously helpful.

Vice Chairman D'AMATO. Is that a question?

Commissioner MULLOY. Yes.

Vice Chairman D'AMATO. That's a question. You can take it for the record.

Commissioner MULLOY. You can submit that in writing.

Dr. NAUGHTON. I would submit that in writing. I think that will take most of the day.

Commissioner MULLOY. That would be enormously helpful for you and Dr. Cowhey and others. What is it that we ought to be doing? We want to remain engaged, but these political pressures are building. What do we do as a nation, and how do we respond?

Vice Chairman D'AMATO. All right. Thank you very much.

One quick more question for the panel. Commissioner Bartholomew.

Commissioner BARTHOLOMEW. Thank you. I just want to take a moment to thank our hosts, Dean Cowhey, Professor Shirk and Ambassador Ellsworth.

We're out here in glorious California, and it's difficult to see how anybody could have anything but an optimistic view of what's going on. It's an incredible state. It embodies the optimism, the hope, and entrepreneurial spirit that have made this country great. So thank you for sharing today with us, and thank you for hosting the Commission.

I also wanted to particularly thank Professor Shirk and Dean Cowhey for their service to our country. And as a personal aside, I hope they will be joining us back in Washington sometime in the near future. We'll be taking them away from you again. An observation. Dean Cowhey, I would like to speak with you about this separately, but the importance of freedom for innovation is something I think we really need to be focusing on.

And it struck me as you were talking about hardware China, software India, whether some of that was freedom and democracy.

India software is more creative, hardware is a little bit more mechanical I wonder whether there's any connection there, but we can take that up separately.

My question for Dr. Rozelle is, a lot of what you say flies in the face of conventional wisdom about what's going on in rural China. I'm just trying to understand. One of your sentences in particular was that people in all but the poorest, most remote villages are constantly planning their moves into the cities and more prosperous rural areas to find wage-earning jobs.

How do you reconcile that trend with a more rosy interpretation about what's going on in rural China? If things are going so much better in rural China, why are people looking to leave?

Dr. ROZELLE. That's a very good question. There's one number that I think probably accounts for optimism of the rural economy more than anything, and that's in 1981 when the reform started, 4 percent of laborers had a full-time job off the farm. Okay.

Today 45 percent of the people in rural China have an off-farm job, either full-time or part-time. 85 to 90 percent of households have one member off the farm. An incredible transformation.

Now, why are they doing this? Why are they looking to leave? Well, there's something called the iron law of development economics, which is portrayed by a very simple graph. On the vertical axis it's the proportion of your population in agriculture, hundred percent up here, zero down here. Income along this axis. The world looks like this. There's no rich agricultural countries. Okay. Two percent of our population works on the farm. 4 percent are in purely rural areas. France and Japan spend tremendous amounts of their budget to keep the rural culture alive. It puts them 1 or 2 percent above the line.

So, I mean that this is a natural and it's a healthy shift of the economy. Every economy that's ever developed has gone through it. China's actually behind in this. And it's because of their Maoist policies.

So now, that's the rosy side.

The unrosy side is it's a very painful process. I mean, you send your kid to a sweatshop is basically what you're doing. Why do they do it? And it's because it helps them diversify their risk. It does give them higher income. And it gives them a ladder to step up.

We've shown that there's this ladder that goes up over time.

Commissioner BARTHOLOMEW. It sounds like you've spent a fair amount of time researching and talking to people.

Is there any sense that people who are moving into urban areas have some hope of stabilizing their economic situation back home and that they want to go back to the rural areas?

Dr. ROZELLE. Well, it's very—there's a professor at the University of California, Irvine, that has done—he's a sociologist that talks to migrants. And in 1990 he did a study, and he found that almost 80 to 90 percent of migrants who were in Shanghai said, within five years I'm going to go home and continue to farm. Today he talks to these same—the different migrants, but the new cohort of migrants, and a vast majority of them—first of all, three out of every four 16 to 20 year old has a job off the farm. Okay. You talk

to that cohort, who's in the rural urban areas, and they say, I'm never going to go back.

And it's going to be a challenge for them to stay because China still has a very pro-urban dualistic economy, but that's starting to break down. And, you know, there's where some more sort of food for discontent might come.

Commissioner BARTHOLOMEW. Thank you.

Vice Chairman D'AMATO. Thank you very much. And I want to thank the panel for your indulgence and being with us. We're going to be sending you the transcript for your edits. We're going to take a short break because we're running late. We're going to take a five-minute break, and then we're going to go on. Five minutes.

(Recess taken from 11:13 a.m. to 11:20 a.m.)

PANEL II: CHINA'S TRADE AND INVESTMENT WITH ITS NEIGHBORS

OPENING REMARKS OF VICE CHAIRMAN C. RICHARD D'AMATO

Vice Chairman D'AMATO. We're going to reconvene for our second session of the morning. Will the Commissioners please take their seats. We're back to San Diego. We've got a hometown team here—three professors. The title of this panel is China's Trade and Investment with its Neighbors. Professor Gordon Hanson of the Economics Department here at San Diego; Steve Haggard, Political Science, and director of the Korea-Pacific Program; Richard Feinberg, also a professor of economics at the Graduate School of International Relations here. We'll do the same thing we did this morning. We'll go from right to left. And if each of you would take a maximum of eight minutes to make your presentation, and then we'll go to questions and answers, five minutes each.

We're going to go ahead and start with Dr. Richard Feinberg, professor of economics at the Graduate School here at the University of San Diego—University of California, San Diego. Go ahead.

**STATEMENTS OF RICHARD FEINBERG, Ph.D.
PROFESSOR OF ECONOMICS AND
STEPHAN HAGGARD, PROFESSOR OF POLITICAL SCIENCE
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Dr. FEINBERG. Thank you, Mr. Chairman. Professor Stephan Haggard and myself are preparing a joint presentation here, and he will take the lead in presenting our major findings and conclusions at the outset. Thank you.

Vice Chairman D'AMATO. Okay.

Dr. HAGGARD. Thank you, Mr. Chairman.

My purpose here is to shift the discussion to a consideration of some of the institutional and political issues surrounding trade and investment relations in the Asia-Pacific and how a Pacific community might be built. In particular, I want to talk about the explosion of subregional and bilateral trade agreements within the Asia-Pacific over the last four or five years, and what risks and opportunities those might have for U.S. policy.

If you look historically, except for ASEAN and the move towards an ASEAN Free Trade Agreement, there hasn't been much institution building on the economic front within the Asia-Pacific region

that has lasted. APEC has lost momentum over the last five or six years after committing to the negotiation of a regional Free Trade Agreement in 1994, and that effort has been stalled. While those efforts have been stalled, we've seen a proliferation of bilateral agreements among some of the major powers in the region, most notably Japan, Korea and China. And this is really something new for the foreign economic policies of these three countries. Some of these agreements, such as the ones we see between Japan and Mexico or Korea and Chile, are motivated by efforts to get around what they see as the discrimination in our Free Trade Agreements. But the two real complexes of interest for American policy are what might happen in Northeast Asia and what might happen between Northeast Asia and Southeast Asia.

Let me just start briefly with the Northeast Asian complex. Japan and Korea are now in the process of serious negotiations about a Free Trade Agreement. I suspect those negotiations will come to conclusion over the course of the next year or so. To date, the Chinese have not shown an interest in negotiating a formal trade agreement with either of those countries, although there have been rumors of such a possibility. As a result, the Japan-Korea agreement will probably not be the nucleus of a broader Northeast Asian trade agreement.

The real action has been between Northeast Asia and Southeast Asia. For some time the Koreans and the Japanese have proposed various types of arrangements with Southeast Asia, but the surprising development was the announcement in 2001 of the Chinese intention to negotiate a Free Trade Agreement between itself and the ASEAN countries. This would be a big development, particularly if it forecloses a broader East Asian regional agreement.

The agreement looks like a pretty serious effort, at least as laid out on paper. It aspires to be WTO-compatible in the sense of freeing substantially all trade between the two parties, ASEAN and China. That was unexpected, although there could be a series of exceptions to that agreement. Moreover, the Chinese have sweetened the deal by extending a number of benefits on a short-term basis to the ASEAN countries in agriculture, the so-called "early harvest", which is a sign of the seriousness of their intent. Japan and Korea have tried to respond to China's proposal, but because of agricultural issues, which we've talked about in the morning already, they're very much less well positioned to make the kinds of offers that China has made.

So there's an unintended consequence here of the depth of China's WTO commitments, which is that they have placed China in the position to offer a fairly substantial set of concessions to Southeast Asia in a way that they wouldn't have been in the absence of such earlier commitments.

So what's going on here? In the first instance this has to be seen in a political light. China has had a number of outstanding issues of concern with its southern neighbors or, rather, the southern neighbors have had substantial concerns about China's projection of force, particularly in the South China Sea. Susan Shirk will be talking about those issues later in her testimony. And, of course, there are ongoing concerns about the Chinese Diasporas and how those are treated and how they might affect politics in the region.

With respect to the economic potential, there's about a \$70 billion two-way trade between ASEAN and China. China runs a pretty significant deficit with the ASEAN region, but the growth has really been spectacular. But I would argue, that the real game in these arrangements has to do with investment. The Southeast Asian countries are looking to attract investment in the region. They're looking at China as a possible investor in Southeast Asia in the future as it has been in Hong Kong. But most significantly they are seeking to attract third-party investment from countries like the United States, Europe, Japan, the newly industrializing country. They would like Southeast Asia to become a staging area for building cross-border production networks into China.

And that's an area in which the U.S., I think, can quite substantially benefit from these agreements.

So what are the risks and opportunities of these sorts of arrangements? Well, of course, they can be discriminatory. That's the concern of any preferential agreement, a concern that these might turn into kind of a closed block from which the United States would be excluded. Our view is that that's unlikely to happen. The U.S. market is still very large. Our leverage is large with these countries, and we think that that gives us substantial capacity in negotiating our own agreements with countries in the region. Moreover, I think the NAFTA model shows, such agreements are in no way incompatible with continuing and locking in multilateral commitments.

And, finally—and this has been a recurrent theme of other testimony as well U.S. networks that are already in Southeast Asia are likely to be substantial beneficiaries of this agreement when and if it comes to fruition.

We see groups like the ASEAN U.S. Business Council are strongly supportive of this set of negotiations and seek to benefit from it.

That said, I think it's prudent for the U.S. to have a strategy, a kind of forward strategy to guarantee that these arrangements don't prove discriminatory or exclude the United States. And in large part that's what the administration's ASEAN initiative is about, which is to push for bilateral trade agreements with willing partners, such as Singapore and Australia, that can serve as an offset or reduce any discriminatory effects that these agreements might have. We think that these agreements are worthwhile in showing our strategic commitment to Southeast Asia, both politically, as well as economically. They're only going to work, however, if we choose countries that are willing to make serious agreements, as Australia and Singapore have been and Thailand appears to be. And over the longer run, we need to revive APEC process to make sure that the WTO, as an overarching umbrella will serve as a disciplining mechanism on these agreements so they don't turn in a discriminatory direction. That's my eight minutes, Mr. Chairman. So thanks very much for giving me the opportunity to speak before you today.

[The statement follows:]

Testimony of Richard Feinberg and Stephan Haggard
Graduate School of International Relations and Pacific Studies
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Regional Integration in the Asia-Pacific: Implications for U.S. Policy

A significant development in the trade policy of the Asia-Pacific is the proliferation of preferential trade agreements. The new wave of bilateral and regional agreements is particularly striking because of the participation of the three largest Asian economies: Japan, Korea and China. Following a brief overview of recent developments, we address three questions:

- What accounts for this shift toward regionalism?
- What potential benefits and risks does this new Asian regionalism pose to U.S. economic and security interests in the Asia-Pacific?
- How should the U.S. respond?

The Turn toward Regionalism in the Asia-Pacific

Growing intra-regional trade in East Asia has been driven largely by robust economic growth, unilateral economic reforms, and market forces. Cross-border production networks led by American, Japanese and Chinese multinationals have played a major role in this regard. Formal intergovernmental agreements have been of distinctly secondary importance. By contrast to Europe or the Western Hemisphere, Asia has been slow to develop intra-regional institutions.

In the last five years, however, Asia has seen a rush to regionalism. An overview of the most important recent trade agreements in the Asia Pacific and their current status is contained in Appendix Table 1.

These initiatives evolve around five distinct geographical axes:

- In Northeast Asia, Korea and Japan have initiated negotiations on a free trade agreement, raising the question of whether a wider sub-regional arrangement might evolve.
- Korea, Japan and other countries have sought negotiations with pivotal Latin American countries, motivated in part by an interest in gaining access to the North American Free Trade Area (NAFTA) and/or the prospective Free Trade Area of the Americas (FTAA).
- China, Korea and Japan have entered negotiations with Southeast Asian countries, both as a group through the Association of East Asian Nations (ASEAN) and with individual countries. The China-ASEAN Free Trade Agreement is the most advanced of these initiatives.
- Asian countries collectively, through the Asia-Europe Meeting (ASEM), and bilaterally have pursued trade agreements with the European Union (EU) and the European Free Trade Area (EFTA).
- Finally, the United States has ratified a Free Trade Agreement (FTA) with Singapore, entered into negotiations with Australia and Thailand, and proposed a broader Enterprise for ASEAN Initiative (IEA).

Precursors to the new Asian regionalism can be found in the Australia-New Zealand Closer Economic Relations Trade Agreement (1983) and the Association of Southeast Asian Nations Free Trade Area (AFTA, 1992). But the new wave of regionalism was set off by Singapore, Japan, and Korea, three countries that had long maintained a strong principled commitment to multilateralism. Singapore negotiated a bilateral FTA with New Zealand in 1999 (effective 2001) that included not only trade in goods and services but investment and government procurement as well. Japan's first bilateral agreement was reached with Singapore in January 2002 and went into effect in November (the Japan-Singapore Economic Partnership Agreement, JSEPA). Notably, this agreement largely excluded the contentious agricultural issues that were to hamper subsequent Japanese efforts in Southeast Asia, but it did include a national treatment provision with respect to investment. Japan has subsequently pursued negotiations with Mexico and Chile, two pivotal Latin American countries. Korea's first FTA was with Chile. Finalized in February 2003, ratification has been delayed because of resistance from farmers, but it is likely to be passed by the Korean National Assembly soon.

In Northeast Asia, an FTA between Japan and Korea would be a major development. A joint study group on a Korea-Japan FTA concluded almost two years of preparatory work in October 2003, and negotiations are now beginning in earnest with the stated intention of reaching a final agreement by 2005. Wider regional integration in Northeast Asia appears unlikely to develop in the near term. The Chinese have not shown an interest in negotiating an FTA with either of the other major

powers, despite the rapid market-driven growth of trade, investment and other forms of economic cooperation between China and Korea in particular. The Chinese stance could change pending a successful settlement of the North Korean nuclear issue, but at present a formal Northeast Asian economic agreement seems an unlikely prospect.

A complex web of negotiations has emerged between Northeast and Southeast Asia. As early as 1998, Kim Dae Jung and the ASEAN Secretariat advanced the idea of forming an East Asian FTA consisting of the "ASEAN+3" or APT: ASEAN plus China, Japan and Korea. In 1999, the ASEAN+3 issued a Joint Statement on East Asian Cooperation that committed the group—albeit vaguely—to a dialogue on economic, political and social issues. These ideas were surprisingly similar in scope—although not in spirit—to a 1990 proposal by former Malaysian Prime Minister Mahathir for an East Asian Economic Grouping (EAEG) that self-consciously excluded the United States.

The prospects for region-wide economic cooperation along these lines were preempted, however, by Zhu Rongji's surprising proposal in November 2000 for a China-ASEAN FTA, which, depending on the precise timing of concessions, would grant Southeast Asian countries preferential access to the China market as China's WTO concessions are phased in. It took two full years to finalize a framework agreement, and negotiations on a number of components of the agreement remain to be finalized. ASEAN caution has been driven by anxieties about China's growing economic and geopolitical influence in the region, particularly with respect to ASEAN's newest members (Vietnam, Myanmar, Laos and Cambodia), and by resistance from business sectors vulnerable to Chinese competition. Nonetheless, the framework agreement signed in November 2002 had a number of striking features:

- The agreement covers not only trade in goods, but trade in services and investment as well.
- The agreement aspires to conform with Article XXIV of the GATT/WTO which requires that FTAs free "substantially all" trade. The very concessions that China made in the context of its WTO accession negotiations with the United States had the unintended consequence of positioning it to make substantial offers in its negotiations with ASEAN, for example on agriculture.
- China offered a number of "sweeteners" in order to allay ASEAN concerns, including an "early harvest" provision granting a quick reduction of tariffs on a number of items as well as preferential treatment of the new, least-developed ASEAN members.

The Chinese initiative was a setback for Japan and Korea. Japan was quick to respond with initiatives of its own in the form of a proposed Closer Economic Partnership (CEP) with ASEAN that would cover not only trade and investment but also science, technology, education, and tourism. Korea was somewhat more circumspect, also signaling its intent to negotiate a framework agreement but admitting that agriculture posed a challenge to a bull-blown FTA. As Japan's proposals wound through expert group meetings in 2003, Tokyo also initiated discussions with the Philippines and Thailand, suggesting that its framework approach did not preclude the pursuit of bilateral agreements; it is quite likely that Korea will pursue this strategy as well.

Finally, brief mention should be made of the prospects for what might be called "Greater China" agreements. In June 2003, China and Hong Kong reached a Closer Economic Partnership Agreement (CEPA) that put zero tariffs on 270 products meeting rules of origin requirements, opened 17 service sectors to investment by Hong Kong firms, and promised cooperation on measures to facilitate trade and investment. Taiwan quickly rejected the suggestion that the CEPA provided a model framework for cross-Straits economic relations, which have boomed despite the absence of any legal framework. But the announcement of the China-ASEAN initiative pushed Taiwan to form its own task force on FTAs, focusing on the United States, Japan, Singapore, and New Zealand, and producing a first, "test run" FTA with Panama.

Motives and Causes

To what do we owe this flood of initiatives? The motivations are clearly multiple, but we focus here on three: economic complementarities, including not only trade but investment; "strategic" motives associated with the slowing of progress in other trade bodies; and wider geo-political interests.

The Economic Dimension

Despite rapidly rising intra-regional trade flows, the economic motives behind a number of the proposed intra-Asian regional agreements are not self-evident. The

Chinese and Japanese economies are at very different levels of development, and thus highly complementary. Yet regional initiatives have not occurred along these lines, but rather among economies that appear, at least on the surface, to have competitive export structures, such as Korea and Japan or China and ASEAN. Analysts from ASEAN have continually expressed concern that China's dynamism will push it out of third-country export markets and pose a direct challenge to production and jobs at home.

Yet the ASEAN countries have continued to gain market share in the U.S. in critical sectors such as IT even as China has as well. Moreover, the very rapid growth of the China market has exerted a particular pull on the more advanced economies of the region-Hong Kong, Korea, Taiwan and Singapore-for which China now accounts for roughly 20 percent of exports see Figure 1). The opportunities for Hong Kong and Taiwan are particularly great, and are likely to deepen. China's share of exports from other ASEAN countries starts from a very much lower base, but has grown steadily. Although China has a \$120 billion bilateral trade surplus with the U.S., it runs substantial deficits with its neighbors, including Taiwan (\$40 billion); Korea (\$24 billion), Japan (\$15 billion), Malaysia (\$8 billion) and Thailand (\$5 billion). Most of the deficits with China's neighbors consist of semi-finished goods and components, and some share of them can be attributed to the exports of American multinationals from their Asian locations.

Equally important are the opportunities that such agreements might yield with respect to investment and the further development of cross-border production networks. Research on the hard disk drive industry in Southeast Asia carried out at UCSD shows the close links between trade and investment. American firms in this industry maintained their competitiveness vis-à-vis Japanese and Korean producers by developing cross-border production networks linking facilities in Singapore, Malaysia, Thailand and China. Hong Kong, Taiwan and Singapore all expect that bilateral agreements with China will provide advantages to them as investors in their own right, as valuable sites for third-party investors, and as potential recipients of outbound Chinese investment in the future. The Japan-Singapore Economic Partnership Agreement contained a national treatment clause and Singapore has openly advertised its belief that the China-ASEAN FTA will create incentive for firms both inside and outside ASEAN to invest there to serve the China market. The potential for outbound Chinese investment is already visible in Hong Kong, and the China-ASEAN FTA will help make ASEAN an attractive site for such investment in the future.

The Economic Strategy Dimension

In addition to the economic benefits, Asian countries have been fairly straightforward about what might be called the "economic strategy" dimension of their pursuit of regional and bilateral arrangements.

- Of the three major economic regions, Asia was the last to pursue preferential ties. As recently as 2001, only China, Hong Kong, Korea, Taiwan and Mongolia—of all 144 WTO members—were not members of some preferential trading agreement. Asian policymakers have paid close attention to the development of regional arrangements in Europe and the Western Hemisphere and are sensitive both to their success and to their discriminatory consequences. A number of recent Asian initiatives suggest efforts to dilute the discriminatory nature of existing regional agreements, for example, by negotiating with key Latin American countries.
- The pursuit of more narrow regional and bilateral agreements is also a response to the fact that more encompassing regional efforts through APEC have not lived up to their promise. After the agreement in 1994 to negotiate a region-wide free trade and investment area and the success in brokering a broader liberalization in the information technology sector, APEC suffered a steady loss of momentum and focus. A number of APEC members resisted further liberalization in the wake of difficult Uruguay Round obligations, but the absence of clear leadership was clearly a factor. Underneath this weakening of APEC lie domestic political changes in key states including Australia (the return to conservative government in 1996), Japan (the stagnation of the 1990s and the objections to the 1997 Early Voluntary Sectoral Liberalization initiative), the United States (domestic divisions over trade policy and the rising preoccupation with security issues), and China (preoccupation with negotiating and implementing WTO accession).
- Finally, the dramatic collapse of the Cancun ministerial has derailed the Doha Round, at least momentarily. Some Asian analysts, pursuing a line of thinking advanced by former Malaysian Prime Minister Mahathir, argue that closer

Asian cooperation would give the region more weight in global trade negotiations when they resume in earnest.

Political and Geostrategic Motives

In addition to these economic motives, a number of recent agreements are embedded in broader diplomatic initiatives. The Japan-Korea initiative reflects a welcome political rapprochement between those two countries. Taiwan's interest in FTAs is tied to its ongoing efforts to break out of its political isolation. Japan's initiatives toward ASEAN were clearly a response to China's initiative. These political motives are important to keep in mind because they suggest that some of these initiatives may have weak economic underpinnings and bases of support and are thus likely face difficulties in negotiation and implementation; we should not assume that these initiatives will necessarily bear fruit.

Beijing's proposal of an FTA with ASEAN marks the culmination of an on-again, off-again effort in the post-Tiananmen period to improve relations with its Southern periphery. ASEAN's response to Beijing's crackdown was notably muted, especially in comparison to the American and European reactions. But Southeast Asia has had a number of security concerns about China, including its push to develop force projection capabilities, its behavior across the Taiwan Straits in the mid-1990s, and its ambitions in the South China Sea. Over the 1990s, China began to participate in multilateral processes and extended assistance, however modest, during the Asian financial crisis of 1997–98. China-ASEAN trade and investment relations are still relatively small, but Southeast Asian countries share with China a number of concerns about U.S. trade policy, such as the view that trade should remain distinct from political, human rights and labor concerns, or that these policy linkages contain a risk of disguised protection.

Implications and Policy Response

Critics of FTAs and bilateralism have always argued that they are fundamentally discriminatory and introduce unnecessary complexity into trade and investment relations through the introduction of rules that are not common across cases. Technical elements of such agreements, including particularly rules of origins and phase-in provisions, make it difficult to gauge their consequences. In Asia, there is concern that such agreements could spell the rise of institutions that exclude the United States and could be a prelude to political alliances that are inimical to U.S. geostrategic interests. Of particular concern is the prospect that China would play the role that Japan was once thought to play in the region: the dynamic leader of a regional bloc that would ultimately use its economic clout for political and geostrategic ends adverse to U.S. interests.

We share some of these concerns, but generally find them exaggerated. First, it is important not to confuse the rhetoric of new agreements with reality. It is one thing to proclaim intentions to negotiate or to sign framework agreements; it is quite another to negotiate details and implement them, particularly among such diverse and in many cases historically hostile countries. The 1994 APEC initiative for a regional FTA is salutary in this regard; the "spirit of Bogor" proved ephemeral, and lacking in conviction. Few of the many agreements that have been negotiated to date have been "difficult" in the sense of forcing hard choices on the signatories, as for example, the NAFTA did in North America. Those that have, such as the ASEAN Free Trade Agreement, have made concessions to political reality and have adopted a "two-tier" approach in which derogations have been allowed for some countries and sectors. A number of initiatives, such as the Korea-Chile agreement, have already run afoul of domestic resistance.

Second, it is important to underscore that to the extent that such agreements do succeed, U.S. firms and their suppliers stand to be direct and immediate beneficiaries. U.S. firms have maintained or even regained their competitiveness in a number of crucial high-technology sectors by acting as "lead managers" in cross-border production networks that span the Asia-Pacific region. Crucial to the effectiveness of these networks are liberal investment rules, free trade, and a smoothly functioning logistics infrastructure. Continuing liberalization within Asia facilitates the development of these cross-border production networks, which have been crucial for U.S. competitiveness in Asia over the last decade.

Third, to the extent that these agreements succeed, they can serve broader U.S. interests in liberalization and economic reform in Asia. As we have seen in Mexico, strong regional agreements can serve to support domestic reformers and lock in broader liberalizing initiatives. By exposing countries gradually to the requirements of global competition, they are driven to adopt world-class standards in areas as diverse as information technology, environmental protection and transportation secu-

rity. In this indirect manner, FTAs can be supportive, rather than undermining, of multilateralism.

Finally, as Figure 1 shows, trans-Pacific trade continues to be extremely important for the Asia-Pacific. Current macroeconomic policy dictates that the United States will run large trade deficits and borrow extensively abroad; at the present, those trade deficits and foreign financing are concentrated to an important degree in the Asia-Pacific. As the largest market in the region, however, the United States also exerts a strong pull on Asian exporters. This pull provides the United States with leverage in the region and simultaneously deters agreements that put that relationship in jeopardy.

Despite these considerations, it is only prudent that the United States have a political and economic strategy towards Asia that shows our continuing commitment to the region and guarantees that those agreements that are reached are not discriminatory in nature.

The WTO and APEC are, in theory, ideal instruments for exercising discipline on such agreements. Efforts in this direction in both organizations are currently stalled, but should not be abandoned.

But multilateral efforts are not incompatible with regional ones. The Bush administration has made “competitive liberalization” through FTAs a central organizing concept of U.S. trade policy. Singapore and Chile were first in line, negotiations have been completed with Central America and talks are now underway or are to commence shortly with Australia, Bahrain, the Dominican Republic, Colombia, Peru, Morocco, South Africa and its neighbors, and Thailand. In these negotiations, the U.S. has argued for agreements that go beyond trade to include the full panoply of new issues that are of interest to American multinationals: services, investment protection, intellectual property rights, e-commerce and digital piracy. The U.S. has also sought to incorporate its domestic social agenda—particularly labour rights and environmental protection—into FTAs.

We believe that the competitive liberalization strategy is broadly justified, as a means of spurring regional and ultimately global liberalization, showing U.S. commitment to the Asia Pacific and neutralizing the discriminatory components of intra-regional efforts. For such a strategy to be successful, however, several further considerations are necessary.

- The United States should push for cutting edge agreements where possible, as has been done in the case of Singapore, since they have the benefit of establishing useful precedents.
- FTAs can be used to reward reformers and to promote democratization. The U.S. is correct to have selected Thailand, as opposed for example to Malaysia or the Philippines, as the first prospective ASEAN FTA partner after Singapore.
- For such negotiations to be meaningful, fair and successful, the U.S. must be prepared to confront its own domestic protectionists in order to make reciprocal concessions, including in sensitive agricultural areas that are of continuing interest to a number of Southeast Asian countries.
- The erosion of the Congressional consensus behind free trade poses a threat to further trade policy liberalization of any kind. The Executive Branch needs to rebuild a wide bi-partisan base that recognizes U.S. economic, political and geo-strategic interests in FTAs. This will require, among other things, that the broader public come to view trade agreements as being fair and equitable, and as promoting trade and investment patterns that spread the benefits of globalization more equally both at home and abroad.
- An important component of such a strategy is to focus aggressively and persistently on enforcement and monitoring of existing agreements, including China’s WTO commitments, to ensure their credibility and to increase U.S. access and exports to the region

Conclusions and Recommendations

- Intra-Asian economic regionalism is being driven primarily by market forces and by the rapid growth of the Chinese economy as a regional development pole. This process will persist so long as the Chinese and other regional economies continue on their rapid growth trajectory.
- Asia is at an early stage in negotiating and implementing regional trade agreements. We should not confuse proclamations of intentions with assured outcomes. Many of the announced FTA initiatives may never mature.
- The United States should not be opposed to Asian regionalism per se. Ideally, it can spur regional efficiency and growth, help stabilize geopolitical relations, and act as a spur outside the Asia-Pacific to a resumption of multilateral negotiations through the WTO.

- Intra-regional trade agreements must also be understood in the context of the rapid development of cross-border production networks in which U.S. firms are key players. U.S. firms stand to gain from agreements that appear on the surface to be “intra-Asian.”
- However, the U.S. should be concerned about the potential for distortions and discrimination inherent in preferential trading agreements.
- In the continued absence of significant trade and investment liberalization in the World Trade Organization (WTO) and the Asia Pacific Economic Cooperation (APEC) forum, as a guarantee that regional agreements do not exclude the United States, and to maintain a U.S. economic and geopolitical presence in the Asia Pacific, the U.S. should continue to pursue its own regional FTA strategy with willing and carefully selected partners. The U.S. should avoid a panic-driven proliferation of FTAs of questionable economic depth or political value.
- This strategy is only likely to work, however, if the content of these agreements is genuinely reciprocal.
- Over the longer run, the U.S. should strive to make the WTO and APEC into instruments for disciplining regional trading agreements, to minimize their discriminatory nature and to render them as consistent as possible with global norms.

Appendix

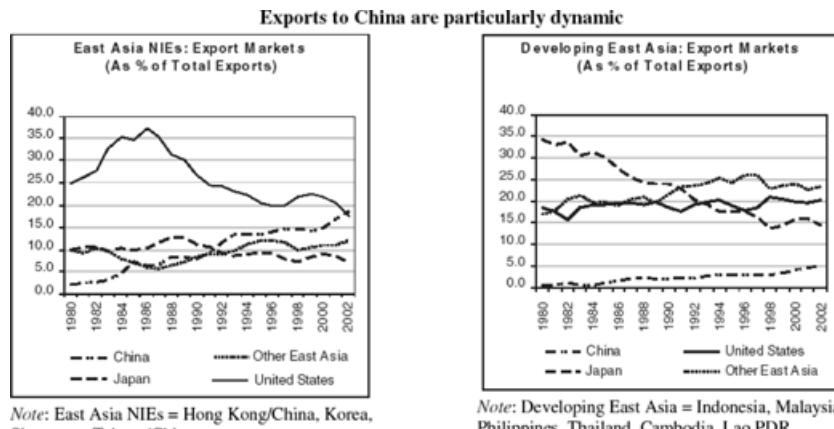
**Table 1: Select Preferential Trade Agreements in the Asia-Pacific
(Status as of February 2004)**

Country/Grouping	Partner/partners	Status
ASEAN	ASEAN	Proposed Common Market
	China	Framework Agreement signed 2002
	EU	Trans-Regional EU-ASEAN Trade Initiative, 2003
China	Japan	Framework Agreement signed 2003
	Korea	Proposed
	United States	Enterprise for ASEAN Initiative, 2002
Japan	ASEAN	Framework Agreement signed 2002
	Hong Kong	Closer Economic Partnership Agreement, 2003
	Malaysia	Under negotiation
	Singapore	Under negotiation
Korea	ASEAN	Framework Agreement signed 2003
	Korea	Under negotiation
	Mexico	Under negotiation
	The Philippines	Under negotiation
	Singapore	Economic Partnership Agreement, 2002
	Thailand	Under negotiation
Malaysia	Chile	Pending ratification
	Mexico	Negotiations suspended, 2003
	Japan	Under negotiation
	Singapore	Proposed
The Philippines	China	Under negotiation
	Japan	Under negotiation
Singapore	United States	Proposed
	Japan	Under negotiation
	United States	Proposed
	Australia	Agreement signed, 2003
	Canada	Under negotiation
	China	Under negotiation
	EFTA	Agreement signed, 2003
	EU	Proposed, rejected by EU
	India	Under negotiation
	Japan	Economic Partnership Agreement, 2002
Taiwan	Korea	Under negotiation
	New Zealand	Agreement signed, 2000
	New Zealand and Chile	P3FTA proposed
	Sri Lanka	Proposed
Guatemala	Guatemala	Under negotiation
	Panama	Agreement signed, 2003

**Table 1: Select Preferential Trade Agreements in the Asia-Pacific—Continued
(Status as of February 2004)**

Country/Grouping	Partner/partners	Status
Thailand	Australia	Preliminary agreement signed, 2003
	China	Agreement signed, 2003
	India	Agreement signed, 2003
	Japan	Under negotiation
	New Zealand	Under negotiation
	Singapore	Under negotiation
	United States	Under negotiation
United States	ASEAN	Enterprise for ASEAN Initiative, 2002,
	Australia	Under negotiation
	Malaysia	Proposed
	The Philippines	Proposed
	Thailand	Under negotiation

Figure 1



Note: East Asia NIEs = Hong Kong/China, Korea,

Singapore, Taiwan/China.

Source: IMF, *Direction of Trade*; data reported from exporter country accounts.

Note: Developing East Asia = Indonesia, Malaysia, Philippines, Thailand, Cambodia, Lao PDR, Mongolia, Myanmar, Vietnam.

Source: IMF, *Direction of Trade*; data reported from exporter country accounts.

Vice Chairman D'AMATO. Thank you very much, Dr. Haggard. And thank you for revealing the San Diego line today here for the Commission. Now we'll just move right on to Dr. Hanson.

**STATEMENT OF GORDON H. HANSON
PROFESSOR ECONOMICS
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PACIFIC STUDIES
UNIVERSITY OF CALIFORNIA, SAN DIEGO**

Dr. HANSON. And more of the same.

Vice Chairman D'AMATO. More of the same.

Dr. HANSON. I'm another San Diego representative.

The high level of discussion in this morning's panel actually covered a lot of what I had included in my written remarks. And so what I would like to do is to speak extemporaneously and to try and push that discussion forward. Commissioner Mulloy put two visions of the global economy on the table: One by Paul Craig Roberts which says that new forms of trade are a threat to the United States; another by Gregory Mankiw, the chairman of President

Bush's Council of Economic of Advisors, which says that international outsourcing and the new business models that we are seeing in operation present opportunities for gains to the U.S. economy. The discussion about China is really a debate about whether the new business model that we're seeing is something that is of benefit to the country as a whole and also about the distribution of those benefits. To very quickly sum up, what we've seen in China is a country that has been rapidly incorporated into global production networks, which are formed by multinational firms. This business model is based on the idea of taking production, breaking it into stages and locating each stage where it can be done at least cost.

So where the U.S. typically fits into this production chain is in the more skill- and technology-intensive activities. So that includes research and development. That also includes a whole range of business services that get goods to consumers and also involves production of more sophisticated components.

Where China fits into that production chain is primarily in a pretty narrow task of processing parts and components that have been produced in the rest of the world.

Now, given that China comes at the end of that production line, it gets to some extent unfairly singled out as being the culprit in the impacts that this model of global production networks has had on the U.S. economy. But just to reiterate a couple of key points. 55 percent of China's exports are exports that are based on processing parts and components that have been made in the rest of the world. What that means is that those goods that arrive from China in the United States embody not all that much value added from China. Research that I've done with Robert Feenstra at the University of California at Davis suggests that China's contribution in terms of value added to those processing exports it sends to the rest of the world is only 36 percent. That means that nearly two-thirds of the value added in those processing exports that China is sending abroad represent goods and services that have been manufactured elsewhere. Now, let's come to the key question of interest. What does this mean for the U.S. economy?

In work that Professor Feenstra and I did—which is not mentioned in my written testimony, but which I'm happy to make available to the Commission—we examined the labor market consequences of international outsourcing for the U.S. economy, focusing on U.S. manufacturing in particular.

And in designing that study, one important thing for us to incorporate was the fact that greater opportunities for trade is not the only, and by no means the most important, shock that has hit the U.S. economy and U.S. manufacturing in particular over the last two decades.

The rapid pace of technological development has also meant tremendous changes in the organization of work.

Our challenge in this study was to try and estimate what's the relative contribution of these new forms of technology versus these new forms of trade in international outsourcing for the wages that manufacturing workers earn. We're, in particular, interested in trying to understand how the wages of white-collar, more skilled

workers had changed relative to the wages of blue-collar workers with—who typically have lower education levels.

The key finding in that study is that outsourcing does tend to benefit white-collar workers more than blue-collar workers. But the impact of international outsourcing is much smaller than the impact of technological change itself.

So as we think about the challenges that are facing U.S. manufacturing, trade is just one of those challenges.

And we've got firms that are trying to deal with a dramatically changing production environment. And those changes create opportunities for the U.S. economy to move into new goods, into new activities, and that—that's the basis for—that is the inaction and the basis for productivity growth on which increases in the standard of living of our economy are based.

But those changes, be they in the form of technological change or in the form of increased international outsourcing, have costs. Commissioner Becker talked about the 400,000 jobs that are at stake if the multifiber arrangement is phased out as is planned. Those dislocation costs are real, but as we think about visions for the future of the American economy, you can—you can think about one vision, which delays that adjustment yet, further into the future.

In some sense thinking about those 400,000 jobs that are at stake, one question we might want to ask ourselves is, why have we left the multifiber arrangement in place so long? Why have we exposed so many workers to the risk of competition from low-wage countries throughout the world?

The problem is not going to get better. The problem is only going to get worse over time. The longer we delay adjustment, the more costly it is going to be to those individual workers, to the communities and the regions in which they live to incorporate them into other sectors. Let me make two final points in closing. One is in terms of thinking about the employment effects of changes in trade and technological change.

What research has overwhelmingly showed is that the long-term consequences on the employment level is virtually nonexistent. Workers get reemployed. It can take a while. It can be painful. It often happens in different industries, in different communities and in different regions. And that is where the painful adjustment occurs, in that process of moving workers and workers moving themselves from one sector and one region to another. The final point I wanted to make related to thinking about an alternative vision, one that doesn't prolong adjustment, but thinks about how the U.S. is going to fit into this global production chain in the future. And that's one in which we continue to develop our capacity to lead the world in research and development and producing sophisticated componentry. The basis for that, very simply, as Dean Cowhey suggested this morning, is to educate our way out of having to compete with low-wage—to low-wage countries.

Two instructive examples come in the form of Hong Kong and Taiwan. These two countries face a much more direct threat in terms of jobs from China than the U.S. has.

How have they fared? Tremendous reallocation out of manufacturing into activities that's been made possible by very high levels

of investment in human capital. Hong Kong's manufacturing sector went from 25 percent of GDP in 1980 to about 4 percent per day—today. Those workers are now employed in business services, making international trade possible.

So the adjustment is feasible, but the basis in all of these examples is high levels of investment in human capital.

[The statement follows:]

**Prepared Statement of Gordon H. Hanson, Ph.D.
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Pacific Studies
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1. Introduction

In the last two decades, China has emerged as an export powerhouse. The country has become a major global player in a wide range of industries. China's export success began with simple consumer products, such as apparel, footwear, and toys, and has since expanded to include electronics and other more technologically advanced products. The rapid growth in China's exports has caused concern in many quarters. The size and accelerated expansion of China's economy have created the perception that the country will come to dominate much of global manufacturing, forcing painful adjustments on the part of its trading partners.

In my testimony today, I will argue that concerns about China's export prowess are exaggerated. China's export growth, while impressive, has been made possible by an equally impressive expansion of imports of business services and intermediate inputs from many countries, including the United States. A substantial fraction of China's trade is related to its participation in global production networks. In these networks, which are organized by multinational enterprises (some of which are headquartered in the U.S.), China's primary role is to assemble final goods that have been designed in other countries out of inputs that have been produced in other countries. Thus, a substantial fraction of China's exports embody goods and services produced elsewhere.

Below, I will describe the structure of China's exports with particular attention to the role of production networks in shaping how China interacts with the rest of the world. I will identify the fraction of China's exports that are associated with the specialized task of assembly, the role of multinational enterprises in China's export production, and the fraction of China's exports that are attributable to value added in China versus other countries.

2. Export Processing in China

Over the last several decades, much of the developing world has adopted trade policies that favor export production. Typically, the early periods of export-led development involve *export processing*. In this arrangement, firms import parts and components from abroad, process these inputs into finished goods, and then export the final products. In the 1970s, Hong Kong, Singapore, and Taiwan assembled and exported footwear, clothing, and other consumer goods (Findlay and Wellisz, 1993). In the 1980s, China, Mexico, and much of Southeast Asia developed extensive export processing operations (Grunwald and Flam, 1985; Yeats, 2001). And in the 1990s, Central America, Eastern Europe, and South Asia joined the fray.

2.1 Policy Regimes for Export Processing

Export processing plays a major role in China's foreign trade. (All trade data for China are for the mainland and exclude Hong Kong. Below, we provide data on trade between Hong Kong and the mainland.) Table 1 shows that over the years 1997–2002, processing exports accounted for 55.6% of China's total exports. Export processing in China is broadly similar to that in other countries. Inputs used in export processing are imported duty-free (as are any investment goods used in export processing) as long as these goods are only used to produce exports. Since the early 1980s, China has permitted foreign ownership of export processing plants. It stipulates that all processing plants (whether Chinese or foreign owned) operate according to one of two regimes: a *pure-assembly* regime, in which a foreign buyer supplies a plant in China with inputs and hires the plant to process them into finished goods, all the while retaining ownership over the inputs; and an *import-and-assembly* regime, in which a plant in China imports inputs of its own accord, processes them, and sells the processed goods to a foreign buyer.

- The Pure-Assembly Regime: In this arrangement, a foreign firm supplies a factory in China with materials from abroad (Naughton, 1996). The factory in China, whose role is relatively passive, receives orders from and delivers processed goods to the foreign client, who then sells the goods outside China. While the factory takes possession of the imported materials during processing, the foreign firm retains ownership over them. The foreign firm pays the factory in China a fee for its processing services. To obtain clearance from Chinese customs to import materials and to export processed goods, the terms of the transaction between the Chinese factory and the foreign firm must be stipulated in a written contract and presented in advance to Chinese customs officials for approval. Legally, the processing factory may use imported materials for the sole purpose of meeting its obligations to the foreign client.

- The Import-and-Assembly Regime: In this arrangement, the processing factory in China plays a more active role. Table 1 shows that this regime is the more common form of export processing, accounting for 70.7% of processing exports over the 1997–2002 period. The factory imports materials of its own accord and takes ownership of these materials during processing. It may broker deals to process goods for multiple foreign firms (World Bank, 1994). Thus, the factory in China controls both the import of inputs and the export of processed goods (though usually not the marketing and sale of the good to end users). Legally, Chinese customs treats processing plants under this regime as bonded warehouses—facilities that are permitted to import inputs duty free under the proviso that they export all output (bonded goods cannot be transferred to another party without the approval of Chinese customs). To become a bonded warehouse, a plant must apply to the Chinese government and have warehouse facilities and accounting personnel that meet government standards. Under either export processing regime, exporters are required to submit monthly reports on the status of their contracts and to verify that the contract has been completed within a month of having exported the finished goods.

2.2 Foreign Investment and Export Processing

Foreign-invested enterprises (FIEs) play a major role in China's overall trade, and in China's processing trade in particular. Table 1 shows that over the period 1997–2002 FIEs accounted for 62.8% of China's total processing exports. (The Chinese government recognizes two categories of FIEs, wholly foreign-owned enterprises and equity joint ventures in which a foreign interest has at least a 25% ownership stake. One question is whether a 25% ownership share gives a foreign party effective control over a processing factory. Standard definitions of whether an enterprise is foreign controlled set a lower ownership threshold, such as 10% in the case of the U.S. government. Thus, I classify both wholly-owned enterprises and equity joint ventures as FIEs.)

Export processing began to take off in China in the late 1980s. The pioneers in the sector included Hong Kong trading companies that set up processing plants across the border from Hong Kong in Guangdong Province and used Hong Kong as a base from which to manage their operations (Sung, 1991). Hong Kong continues to mediate a large fraction of China's processing trade. Table 1 shows that over the sample period, 45.9% of China's processing exports were re-exported through Hong Kong.

Another reason—besides proximity to Hong Kong—that coastal China has developed more export processing than the rest of the country is that over the last two decades trade policies have varied substantially across regions of the country. In the early stage of China's economic opening, the government permitted foreign trade and investment only in Special Economic Zones (SEZs) located in the southern coastal provinces of Guangdong and Fujian. In the mid to late 1980s, the government expanded the number of regions in which foreign trade and investment were permitted. By the 1990s, foreign trade and investment were allowed (subject to government approval) throughout the country (Demurger et al, 2001). Still, much export activity continued to be concentrated in SEZs. Advantages to being in an SEZ may include expedited treatment by customs of imported inputs and exported outputs, more freedom to import or export goods directly rather than through state-owned foreign trade corporations, greater opportunities to retain foreign exchange earnings, and access to various types of tax incentives. There are also a separate court system set up to handle civil and commercial legal cases in trade zones (Wang, 2000).

SEZs have been succeeded by second and third generation trade and development zones, including bonded areas, Economic and Technological Development Areas, and Hi-Technology Development Areas. These zones are managed by provincial governments and so may exhibit regional variation in their organization and effectiveness.

2.3 Value Added in Export Processing in China

Given the importance of imported inputs in China's processing exports, the total value of China's exports overstates the Chinese content of these goods (i.e., the fraction of these exports that represent value added in China). In recent work (Feenstra and Hanson, 2003), I have estimated the fraction of China's processing exports that is attributable to Chinese value added. An initial measure of value-added in Chinese export processing is the difference between the value of processing exports and processing imports (relative to processing exports). As shown at the bottom of column (3) in Table 2, average value-added is 36% over all products and years 1997–2002. Thus, nearly two-thirds of China's processing exports embody part, components, and other intermediate inputs produced in other countries.

There is considerable variation in processing trade and in Chinese value added in export processing across industries and provinces in China. In Table 3, I summarize the industry variation at the level of one-digit SITC (Standard Industrial Trade Classification) industries. (It is not possible to measure value added by individual products—i.e., within one-digit industries—since it is not known what other products they use as inputs.) To show how electronics differs from other industries, I separate out SITC 7, which is machinery and transport equipment and which includes computers and other electronics products, from other SITC categories. To show how these industries differ between the more-developed coast and the less-developed interior, I show value added separately by province. For the coastal provinces, there are roughly equal processing exports within SITC 7 and outside this category. But the inland provinces have about four times as much processing exports *outside* of this category. Thus, production of more technologically sophisticated exports—computers, electronics, and other machinery—is concentrated in coastal China. The most important sector for the inland provinces is SITC 8, which includes apparel, footwear, toys, and other labor-intensive industries.

Average value-added estimates by 1-digit SITC industries are shown in column (3) of Table 2. The industries with the greatest processing exports are SITC 6 (manufactured goods), SITC 7 (machinery and transport equipment, including electronics) and SITC 8 (miscellaneous manufactured goods, including apparel, footwear, and toys). There is relatively low value-added of 16% in SITC 6 and 8, and higher value-added of 55% in SITC 7. As described by Yeats (2001), SITC 7 includes a number of individual products and their parts, such as: automobiles and their parts; computers and their parts; various types of machinery and their parts; etc. Thus, value added in China appears to be higher in electronics and other technologically more advanced goods than in apparel, footwear, toys, and other more labor-intensive goods.

3. Hong Kong's Role in China's Exports

Beyond its specific involvement in export processing in China, Hong Kong plays an important role in distributing goods produced in China. Since the early 1980s, Hong Kong has become increasingly specialized in the re-export of Chinese goods. In this arrangement, traders in Hong Kong import goods from China and then distribute them to destination countries. Over the period 1988–1998, 53% of total Chinese exports were shipped through Hong Kong in this manner. Goods that are re-exported are not subject to substantial manufacturing operations in Hong Kong, but are typically subject to simple processing activities, such as sorting or packaging, or service activities, such as marketing or transport. Hong Kong traders provide a range of important intermediation services to the mainland, including finding foreign buyers, sorting and grading goods according to quality, labeling and packaging, and coordinating processing in China with processing in other countries (Naughton, 1997; Feenstra and Hanson, 2002). (Hong Kong also intermediates exports to China from the rest of the world. In 1996, re-exports by Hong Kong accounted for 47% of China's total imports (Sung, 1997).)

In re-exporting Chinese products, Hong Kong adds value to these goods. When the U.S. tallies total imports from China, it adds to direct imports from China imports of Chinese goods re-exported by Hong Kong. But this calculation overstates exports by mainland China, since a fraction of the value of Chinese goods that Hong Kong re-exports represents the value of intermediation services provided by traders in Hong Kong. Recent estimates, reported below, suggest this value added by Hong Kong is substantial, totaling nearly 25% of the total value of Chinese goods re-exported by Hong Kong.

3.1 History of Hong Kong-China Trade Relations

Hong Kong's position as an entrepôt dates back to China's cession of the Island to Britain in 1842 (Sung, 1991). Trade between Hong Kong and China was mostly dormant during the rigid Chinese communist rule of 1949 to 1978. The opening of

China to foreign trade and investment in the late 1970s has lead to dramatic changes in both economies. Before 1980, Hong Kong grew largely through producing and exporting labor-intensive manufactures, such as apparel, textiles, footwear, toys, and consumer electronics (Findlay and Wellisz, 1993). Learning about the production and marketing of these goods, which also account for a large fraction of China's current exports, may have helped Hong Kong become a middleman for global trade (Hamilton, 1999).

Since 1980, Hong Kong has begun to specialize more heavily in business services, particularly those related to trade and investment in China. As described in the last section, China's export manufacturers are concentrated in southern coastal provinces, especially Guangdong which borders Hong Kong (Sung, 1997). Over the last two decades, many Hong Kong manufacturing firms have moved their production facilities to Guangdong, which they manage from headquarters in Hong Kong. Hong Kong firms typically supply plants in China with raw materials and often ship the goods through Hong Kong for inspection, finishing, or packaging before exporting them to a final destination (Sung, 1991). As Hong Kong has shifted production to China, manufacturing has become a much less important part of the Hong Kong economy, declining from 24% of GDP in 1980 to 6% of GDP in 1998. China's economic opening thus has contributed to a dramatic reorientation of Hong Kong's economy from manufacturing to the provision of business services related to international trade.

Why has Hong Kong succeeded in playing such an important role in China's exports? Hong Kong traders appear to have an informational advantage in trade between China and the rest of the world. This advantage may be due to Hong Kong's proximity to mainland China, especially the southern coastal provinces where export production is concentrated (Sung, 1991). Hong Kong traders have developed specialized operations to find Chinese producers who can meet foreign quality standards and to locate buyers for Chinese goods. As middlemen, traders may earn informational rents—that is, a profit margin associated with intermediating China's exports. This profit margin shows up as a markup on Chinese products re-exported by Hong Kong. Below, I report estimates of these markups.

3.2 Sectoral and Geographic Patterns in Hong Kong Re-Exports of Chinese Goods

Table 4 shows the distribution of direct Chinese exports and Hong Kong re-exports of Chinese goods across one-digit SITC industries. Re-exports are concentrated in SITC 8, light manufactured articles, whose major sub-sectors are apparel and footwear. This industry accounts for 57.5% of total re-exports over the sample period (where shares are stable over time). Machinery and transport equipment (SITC 7) and manufactured materials (SITC 6), which includes textiles, are also important sources of re-exports, accounting for 22.4% and 14.0% of total re-exports respectively. SITC 7 and 8 are the two industries in which re-exports account for the largest fraction of total exports, with re-export shares of total Chinese exports equal to 69.5% and 70.1% respectively. These are also the two industries in which outward-processed goods and exports by FIEs dominate China's shipments to Hong Kong.

In contrast to re-exports, *direct* Chinese exports are spread relatively evenly across industries. Light manufactured articles (apparel, footwear) account for only 27.9% of direct exports. Food, mineral fuels, chemicals, and crude material, which account for very small fractions of total re-exports, are relatively large sources of direct exports. In all industries outward processing and exports by FIEs account for a lower fraction of China's direct exports than of China's exports to Hong Kong. (It is important to note that some firms registered as FIEs in China do so only to receive favorable tax treatment, and achieve this by having a partner in Hong Kong. This so-called "round tripping" creates an artificial correlation between FIE activity and trade through Hong Kong.)

To examine the distribution of exports across sectors in more detail, Table 5 lists the two-digit SITC industries that account for an average of at least 2% of either total direct exports or total re-exports over the sample period. Apparel and textile yarn fabrics are major sources of both direct exports and re-exports. Industries which are an important for re-exports but not direct exports include toys and games, televisions and radios, footwear, electrical machinery, luggage, and office machines. These are also industries for which outward processing dominates China's shipments to Hong Kong. Industries which are important for direct exports but not re-exports include fuel oils, vegetables and fruit, fish, and inorganic chemicals.

It appears that the industries that rely most heavily on re-exports are those that produce differentiated products, such as apparel, footwear, toys, and consumer electronics. For many differentiated goods product quality is often difficult to observe or verify, which may create demand for traders in Hong Kong to resolve informa-

tional problems in exchange. These also tend to be goods whose production stages span both high-skill activities, such as product design, and low-skill activities, such as simple assembly, which makes them suitable for outward processing. Differentiated goods are frequently produced in small batches, which creates an incentive to ship through hubs, but they are also high-value-to-weight items, which offsets the incentive to use hubs. Additionally, apparel and textiles are subject to Multi-fibre Arrangement (MFA) quotas in many countries. Shipping these goods through Hong Kong may be a means of circumventing binding quotas on Chinese exports.

Table 6 shows the distribution of direct exports and Hong Kong re-exports across regions and the average share of re-exports in total exports by region. To the extent information costs motivate re-exporting goods through Hong Kong, we would expect to see a higher fraction of re-exports going to rich regions, which have a relatively strong demand for differentiated goods. To the extend that transport costs motivate re-exporting goods, we would expect to see a higher fraction of re-exports going to distant regions, for which the extra distance of shipping goods through a hub would add relatively little to cost.

For both direct exports and re-exports, the major destinations are, not surprisingly, the relatively large markets of North America, Western Europe, and East Asia. The regions for which re-exports account for most trade include the relatively rich and distant regions of North America (71.4%) and Western Europe (62.1%), the relatively rich and near region of Oceania (61.2%), and the relatively poor and distant regions of Latin America (65.0%) and Africa (49.9%). This variation in re-export shares across regions suggests that both information costs and transport costs may be important for entrepôt trade.

3.3 Markups on Hong Kong Re-Exports of Chinese Goods

Net of customs, insurance, and freight charges, Chinese goods are much more expensive when they leave Hong Kong than when they enter. For the 1988–1998 period, the average markup on Hong Kong re-exports of Chinese goods was 24%. The income flow from these entrepôt activities is large. In 1998, re-exports of Chinese goods equaled 47% of Hong Kong GDP. In that same year, Hong Kong markups on these re-exports totaled 12% of GDP, while manufacturing accounted for only 6% of GDP.

Figures 1–3 present estimates for markups on Hong Kong re-exports of Chinese goods. Figure 1 shows the distribution of markups by year using box plots. (The midline in the box shows the median, the box shows the inter-quartile (25th–75th percentile) range, and the upper and lower horizontal lines extend to 1.5 times the inter-quartile range above or below the box. Individual points are observations above or below this range.) Median markup values range from 28% to 34% and are relatively stable over time.

Figure 2 shows the distribution of markups by one-digit SITC industry. Markups appear to be largest for light manufactured articles (SITC 8) and machinery and transport equipment (SITC 7) and lowest for mineral fuels (SITC 3) and animal and vegetable oils (SITC 4). Figure 3 shows the distribution of markups by region. Markups appear to be highest in the rich regions of North America, Oceania, and Western Europe and lowest in the poor regions of Africa and Latin America.

Table 7 shows Hong Kong markups on re-exports from China related to export processing overall and by one-digit SITC industry. The average markup for these goods is 17%, which is somewhat less than for China's overall exports. Since to Figure 2, the highest markups (besides beverages and tobacco) are for SITC 7 (dominated by electronics) and SITC 8 (dominates by apparel, footwear, and toys).

4. Conclusion

China is portrayed in the popular press and by many politicians as an export locomotive that is on the verge of running over the manufacturing industries of the United States and other countries. A detailed examination of the structure of China's export industries reveals a more nuanced picture. China's international trade is an outgrowth of its participation in global production networks, within which China imports substantial quantities of intermediate inputs and business services from other countries. In recent years, around 56% of China's total exports were related to export processing, in which China assembles inputs imported from abroad. Recent estimates imply that of the total value of China's processing exports, only 36% are attributable to value added in China. Thus, official trade statistics substantially overstate the value of China's exports that are attributable to production in the country.

Multinational enterprises, including firms based in the United States, are primarily responsible for the coordination of global production networks. In recent years, foreign enterprises have accounted for about 63% of China's total processing

exports and about 40% of China's total exports. Many of these foreign firms manage operations in mainland China from operations based in Hong Kong. Traders in Hong Kong play an important role in distributing goods produced in China to the rest of the world. Naturally, these traders charge for this service, and the markup they levy is incorporated into the reported value of China's exports. This creates another source of upward bias in U.S. government statistics on China's trade. Approximately 24% of the value of Chinese goods re-exported through Hong Kong is attributed to services provided in Hong Kong.

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Table 1: Foreign Ownership, Export Processing, and Trade in China

Year	Processing Exports/ Total Exports	FIE Ex- ports/Total Exports	Share in Total Processing Exports of		
			Import- and-Assem- bly	Hong Kong Re-Exports	FIE Ex- ports
1997	0.545	0.361	0.704	0.556	0.561
1998	0.568	0.393	0.705	0.552	0.587
1999	0.568	0.413	0.677	0.507	0.609
2000	0.552	0.439	0.701	0.470	0.646
2001	0.554	0.462	0.714	0.456	0.669
2002	0.550	0.484	0.741	0.436	0.697

Notes: Columns (1) and (2) show processing exports and exports by foreign-invested enterprises, respectively, as a share of total China exports; columns (3)–(6) show as a share of total China processing exports, processing exports under the import-and-assembly regime, processing exports re-exported through Hong Kong, and processing exports by foreign-invested enterprises, respectively.

Table 2: Chinese Processing Trade by SITC Industry
(\$million and percent, average 1997–2002)

	(1) Proc- essing Exports (\$ mil- lion)	(2) Proc- essing Imports (\$ mil- lion)	(3) Value- added (per- cent)
SITC 1—Beverages and tobacco	64	6	63%
SITC 2—Crude materials, inedible, except fuels	295	4,568	63%
SITC 3—Mineral fuels, lubricants and related materials	602	1,006	67%
SITC 4—Animal and vegetable oils, fats and waxes	160	224	43%
SITC 5—Chemicals and related products	2,416	11,858	67%
SITC 6—Manufactured goods	16,081	25,750	16%
SITC 7—Machinery and Transport Equipment	60,443	30,486	55%
SITC 8—Miscellaneous manufactured articles	45,949	6,626	16%
Total	128,553	82,600	36%

Notes: See Feenstra and Hanson (2003).

Table 3: Chinese Processing Trade by Provinces and SITC Industry
(\$million and percent, average 1997–2002)

	FDI (\$bill)	Within SITC 7			Outside SITC 7		
		(1) Proc- essing Ex- ports (\$ mil- lion)	(2) Proc- essing Im- ports (\$ mil- lion)	(3) (1)–(2) (1) (per- cent)	(1) Proc- essing Ex- ports (\$ mil- lion)	(2) Proc- essing Im- ports (\$ mil- lion)	(3) (1)–(2) (1) (per- cent)
<i>Coastal</i>							
North							
Heilongjiang	1.3	100	77	22%	114	72	36%
Jilin	1.1	86	34	61%	218	135	38%
Liaoning	5.4	2,551	1,374	46%	2,645	2,249	15%
Beijing area							
Beijing/Tianjin	9.1	4,923	2,760	44%	2,470	2,031	18%
Hebei	2.0	98	31	69%	577	320	44%
Shandong	8.5	1,604	811	49%	5,906	3,862	35%
Shanghai area							
Jiangsu	14.0	7,432	3,903	47%	5,339	4,210	21%
Shanghai	11.6	6,497	3,413	47%	5,877	4,284	27%
Zhejiang	4.0	891	417	53%	2,826	1,622	43%
South							
Fujian	13.7	2,325	1,143	51%	3,791	2,686	29%
Guangdong	39.0	33,229	16,282	51%	35,670	29,033	19%
Hainan	4.0	7.9	2.3	71%	81	57	30%
Total coastal	113.7	59,744	30,247	49%	65,514	50,560	23%

Table 3: Chinese Processing Trade by Provinces and SITC Industry—Continued
(\$million and percent, average 1997–2002)

	FDI (\$bill)	Within SITC 7			Outside SITC 7		
		(1) Proc- essing Ex- ports (\$ mil- lion)	(2) Proc- essing Im- ports (\$ mil- lion)	(3) (1)–(2) (per- cent)	(1) Proc- essing Ex- ports (\$ mil- lion)	(2) Proc- essing Im- ports (\$ mil- lion)	(3) (1)–(2) (per- cent)
<i>Inland</i>							
17 provinces	15.2	699	240	66%	2,596	1,554	40%

Notes: Column (3) reports (processing exports—processing imports)/processing exports for each province, for SITC 7 and all other SITC. We combine Beijing and the neighboring industrial district of Tianjin, while Guangxi is treated as an inland province even though it has some coastline in the south of China.

Table 4: Direct Exports and Re-exports of Chinese Goods, 1988–1998

Year	Total China Ex- ports (bil- lions US\$)	Re-Export Share of Total China Exports			Out- ward Proc- essing Share of China	Foreign-Invested Enter- prise Share of China		
		Direct Ex- ports	Ex- ports to Hong Kong	Total Ex- ports		Direct	Ex- ports to Hong Kong	Total Ex- ports
88	(1) 38.7	(2) 43.1	(3) 12.8	(4) 49.7	(5) 32.1	(6) 1.2	(7) 8.5	(8) 4.7
89	46.3	51.5	19.7	56.9	40.3	3.1	13.4	8.3
90	55.4	55.2	21.9	58.5	43.4	4.2	16.7	10.9
91	67.8	59.1	24.9	61.5	47.1	6.5	19.1	13.5
92	84.7	60.1	24.8	63.1	47.9	8.6	20.8	15.2
93	98.0	61.3	24.4	67.2	49.4	17.8	35.1	27.1
94	120.2	57.7	27.4	62.1	47.7	19.8	35.2	28.5
95	151.6	53.3	32.7	65.8	50.1	21.9	40.6	31.3
96	161.0	49.8	38.1	76.0	54.3	31.3	49.8	39.0
97	181.3	46.9	39.6	69.9	52.7	33.3	47.1	39.1
98	177.7	45.4	40.7	73.8	54.7	36.4	49.7	41.9

Notes: Column (1) shows total China exports (direct exports plus re-exports through Hong Kong) in billions of current U.S. dollars; column (2) shows Chinese re-exports through Hong Kong as share of total Chinese exports; columns (3)–(5) shows the share of exports related to outward processing in direct Chinese exports to countries other than Hong Kong, Chinese exports to Hong, and total Chinese exports; and columns (6)–(8) show the share of exports by foreign-invested enterprises in direct Chinese exports, Chinese exports to Hong Kong, and total Chinese exports.

Table 5: Direct Exports and Re-Exports of Chinese Goods for Selected Two-Digit Industries

SITC	T2Industry	Indus- try Share of Di- rect Ex- ports	Indus- try Share of Re- Ex- ports	Re- Ex- port Share of Total Ex- ports	Outward Proc- essing Share of		FIE Share of	
					Direct Ex- ports	Ex- ports to Hong Kong	Direct Ex- ports	Ex- ports to Hong Kong
03	Fish	(1) 2.9	(2) 0.6	(3) 16.9	(4) 17.5	(5) 23.2	(6) 26.2	(7) 23.5
05	Vegetables, Fruit	3.6	0.9	19.6	4.6	6.2	13.0	12.2
33	Fuel Oils	8.2	0.1	0.8	5.7	28.8	0.6	4.8
52	Inorganic Chemicals	2.1	0.3	12.2	5.3	7.0	4.2	9.2
55	Textile Yarn Fabrics	10.2	8.7	48.6	26.5	37.8	9.1	27.1
66	Nonmetal. Minerals	2.2	1.1	37.5	8.5	29.2	18.8	24.8
67	Iron, Steel	2.7	0.2	8.6	43.1	55.5	4.4	13.1
69	Metal Products	3.7	2.3	41.0	29.2	55.3	10.3	23.6
75	Office Machines	0.6	3.4	88.1	81.3	97.5	63.0	56.2
76	TVs, Radios	1.5	9.3	86.2	75.7	93.2	51.8	58.6
77	Elec. Machinery	2.5	7.1	78.1	50.2	80.0	35.2	41.8
83	Luggage	0.8	5.5	88.5	50.9	85.4	26.8	31.4
84	Apparel	17.2	17.4	53.5	43.5	56.8	21.2	27.3

Table 5: Direct Exports and Re-Exports of Chinese Goods for Selected Two-Digit Industries—Continued

SITC	T2Industry	Industry Share of Direct Exports	Industry Share of Re-Exports	Re-Export Share of Total Exports	Outward Processing Share of		FIE Share of	
					Direct Exports	Exports to Hong Kong	Direct Exports	Exports to Hong Kong
85	Footwear	(1) 2.7	(2) 7.8	(3) 76.7	(4) 52.5	(5) 85.0	(6) 29.0	(7) 55.3
88	Cameras, Watches	0.4	3.2	89.9	58.1	86.2	36.7	46.5
89	Toys, Games	4.9	21.0	82.9	42.5	78.0	25.7	36.5

Notes: The two-digit industries listed above are ones which account for at least 2% of direct Chinese exports or 2% of re-exports of Chinese goods through Hong Kong on average or the period 1988–1998. See notes to Table 3 for definitions of column headings.

Table 6: Direct Exports and Re-Exports of Chinese Goods by Region

Region	Region Share of Direct Exports	Region Share of Re-Exports	Re-Export Share of Total Exports
Africa	(1) 3.2	(2) 2.6	(3) 49.9
East Asia	36.8	18.0	35.6
Eastern Europe	4.2	0.9	24.8
Latin America	2.5	4.2	65.0
Middle East	4.0	2.6	42.8
North America	16.7	37.3	71.4
Oceania	1.7	2.4	61.2
South Asia	2.7	1.0	30.6
Southeast Asia	11.2	6.0	37.8
Western Europe	16.9	24.9	62.1

Notes: This table shows each region's share of Chinese direct exports in column (1) and of total re-exports of Chinese goods by Hong Kong in column (2). Column (3) shows the share of re-exports in Chinese exports to each region. All figures are averages over the period 1988–1998.

Table 7: Hong Kong Markups on Chinese Processing Exports by SITC Industry, 1997–2001

	Out-bound from China
SITC 0—Food and live animals	20.9%
SITC 1—Beverages and tobacco	63.3%
SITC 2—Crude materials, inedible, except fuels	18.5%
SITC 3—Mineral fuels, lubricants and related materials	4.7%
SITC 4—Animal and vegetable oils, fats and waxes	21.5%
SITC 5—Chemicals and related products	12.9%
SITC 6—Manufactured goods	17.9%
SITC 7—Machinery and Transport Equipment	28.5%
SITC 8—Miscellaneous manufactured articles	29.6%
SITC 9—Special commodities and transactions	14.1%
Total	16.7%

Notes: Hong Kong markups are computed as described in Feenstra *et al* (1999).

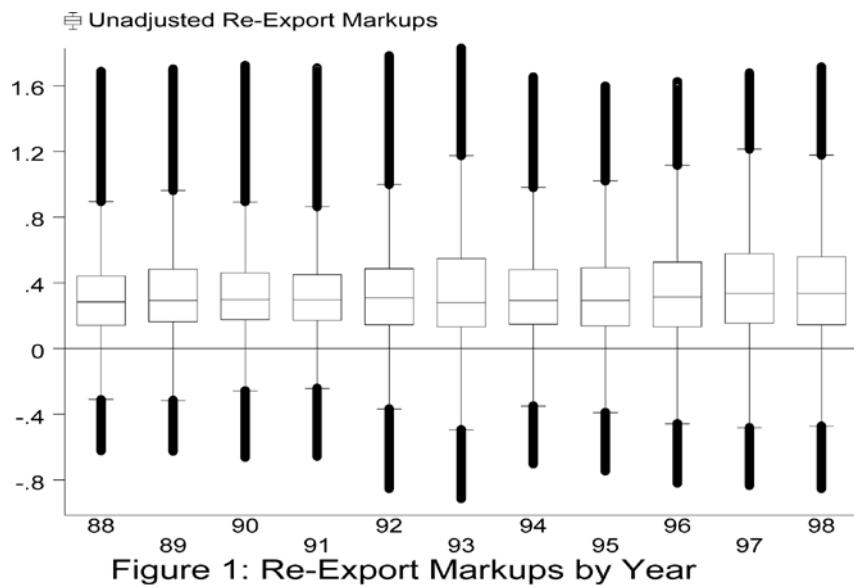


Figure 1: Re-Export Markups by Year

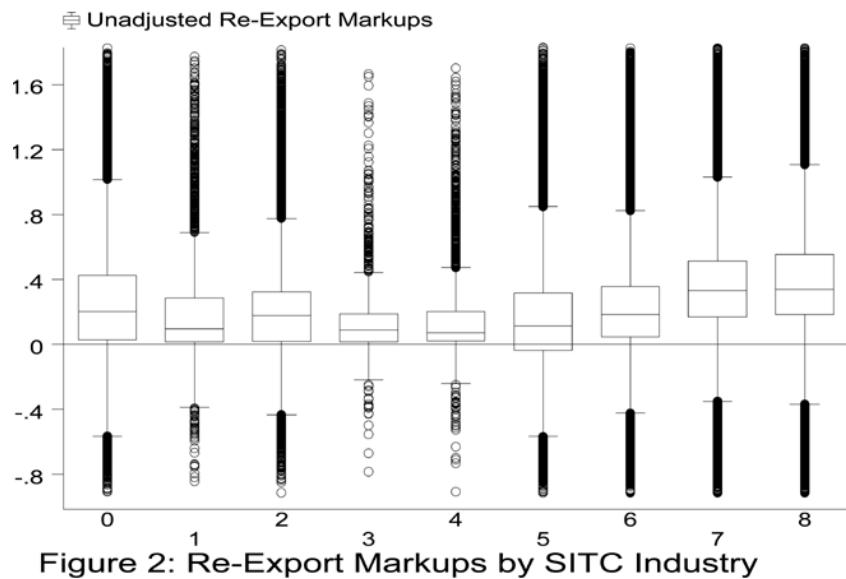


Figure 2: Re-Export Markups by SITC Industry

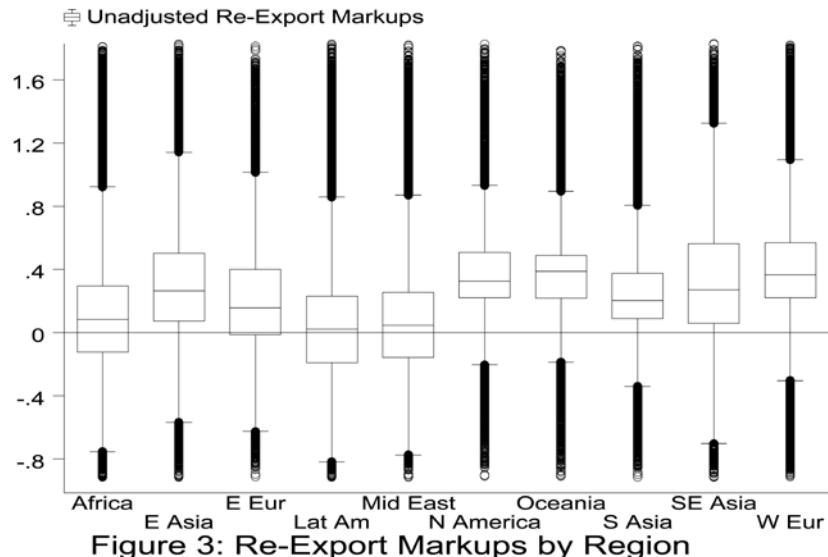


Figure 3: Re-Export Markups by Region

Panel II: Discussion, Questions and Answers

Vice Chairman D'AMATO. Thank you very much for a very interesting statement, Dr. Hanson. And you had a paper you mentioned. We would like to see that.

One announcement I want to make is that there's been some interest and request for there to be an open mike. And we will have an open mike at the end of today's afternoon session for those of you who would like to participate in that. So however long that goes, we don't know, but we'll make that available. I have one question before we go to other Commissioners for both—for the San Diego line here. I'm just wondering how formed up this line is. Because we talk about—you get the impression of—your description of a new business model and, you know, this production chain is sort of like this engine out there and whether we fit into it or whether we mold it—whether we mold it.

There's a lot of talk about trying to incorporate standards of different kinds, labor standards and environmental standards, into the—whatever model develops here. In fact, I think there's going to be a 301 case submitted within the next two weeks on labor standards.

The question is, how do you envision labor standards and environmental standards as becoming a viable part or not of this new business model? Have you thought of that—about that?

Dr. FEINBERG. Yes. Very important question. Thank you very much. Currently U.S. policy is mandated by the trade promotion authority legislation, is that our negotiators are required, of course, to press for the inclusion of both environmental and labor standards in international trade agreements. That was done, in fact, in the case of the U.S.-Chile and the U.S.-Singapore Free Trade Agreement, which Congress passed. Those clauses are also included

in the U.S.-Australia and U.S.-Central American Free Trade Agreements, which the administration has negotiated although not yet submitted to the U.S. Congress. In all of that legislation what is required is the countries implement their own national laws with regard to labor standards and environmental standards. And typically if you travel around the world, national standards are usually pretty good. In fact—on paper.

In fact, if you travel around the world with regard to labor standards, as I'm sure Mr. Becker is very aware, many countries automatically incorporate into their national laws international labor organization conventions. Something the United States, in fact, has generally not done.

So, in fact, in terms of national standards with regard to labor, very often other countries have superior standards, in fact, as compared to our national labor standards as written in law. The issue is implementation. That's the issue, implementation. How does one assure that countries actually implement their own laws? And that is built now into our legislation. So I think the issue is how do we go about monitoring the implementation in these cases? And I would suggest that we ought to follow a multiple approach.

One is trade capacity building, which is to say that in—very often the countries simply don't have the capacity to implement their own laws. Their government bureaucracies don't have the capacity. The managers, the workers, the workers' leaders aren't even aware of their own national laws in the area of labor and the environment.

And we ought to structure, as part of our trade agreements, trade capacity building, which would put together resources which would assist in the implementation of national laws. The second point I would make, however, is that—some have argued that we ought to go to official sanctions-based approach, which is to say we should sign agreements which say if countries don't live up to international standards, we'll cut off trade.

One killer problem with that approach is that countries simply will not sign those agreements. So we're dead in the water if we start from the idea that there have to be tough, enforceable, hard sanctions with regard to labor in the environment. We won't have any more trade agreements.

What we can do, however, is look at the private sector. And in China, as well as in developing countries, most firms these days have what they call codes of conduct. And if you go into a factory in China that sells, for example, to Wal-Mart, you will find on the wall, often in Mandarin, their code of conduct. These are the codes—even if they don't own the factory, if they just purchase from that factory, it's just a contracting factory, there will be the code of conduct on the wall, Wal-Mart's code, which is similar to all the codes basically that are pretty good—maybe not perfect, but pretty good with regard to labor standards.

The issue is, are those labor standards really being implemented? And that's where I think I would suggest that we look to the U.S. private sector to work together in a more organized way with the manufacturers, with the governments, with perhaps the international labor organization and the United States to work with the private sector to see to it that their own codes that every-

body accepts and they're written into contracts, that their own codes with regard to labor and environmental standards are upheld. This, in other words, would be a voluntary market-based-driven system which I think would be much more effective, much more powerful than some of the approaches we have been pursuing up-to-date. Thank you, sir.

Vice Chairman D'AMATO. Dr. Hanson, did you have a point on that?

Dr. HANSON. So in addition to formal institution building, I think it's important to recognize that the informal practice of setting standards is influenced by the process of globalization itself. When multinational firms go abroad, they often export business practices that they follow at home.

There's a large body of research which shows that multinational firms tend to pay considerably higher wages, tend to employ more skilled workers and tend to be more rigorous about following local laws than domestic firms are, on average. And this is, in particular, true for multinational firms that are headquartered in the United States. So apart from—so one way in which we can help countries move towards greater enforcement of laws that are already on the books is by having multinational firms that are subject to much greater international scrutiny than are domestic firms based in a particular country.

Vice Chairman D'AMATO. Thank you very much. Commissioner Becker.

Commissioner BECKER. Thank you very much. In the interest of time, I'm just going to focus on one issue touched by both Dr. Haggard and Dr. Feinberg. This is on the Free Trade Agreements. And I'll refer to your written testimony, Dr. Haggard, on page 6, referring to Free Trade Agreements telling us that in these negotiations the U.S. has argued for agreements that go beyond trade to include the full panoply of new issues that are of interest to American multinationals: services, investment protection, intellectual property rights, e-commerce and digital privacy.

The U.S. has also sought to incorporate its domestic social agenda, particularly labor rights and environmental protection into FTA. I want to draw your attention to two different trade agreements. One, the Chilean agreement, in which we were told by Chilean authorities long before the agreement took place that they were willing to incorporate in the trade agreement with the United States the enforcement of their country's laws, which, incidentally, were pretty good on labor rights. This was bitterly fought by multinationals in this country and rejected by the United States on their behalf. The second trade agreement I want to refer to is the Jordanian trade agreement in which we actually got a trade agreement before Bush became president. And in that trade agreement they agreed to enforce their labor laws, which were extensive and adjusted, in order to get the agreement.

The Administration has repudiated this and said this is not the policy of the United States. I think it may even be in writing. So—but I'm not quite sure on that part. So the point I'm getting at, this is not the policy of the United States, and we may as well face that. It's not the policy of multinationals. And the trade agreements reflect what the multinationals want.

And the last example I will give is we just concluded a Free Trade Agreement with Australia. One of the hot button issues in that trade agreement was eliminating the tariffs here in the United States on sugar.

Surprise, surprise. The multinational lobby for sugar is one of the biggest in this country. And the agreement was finally concluded without adjusting the tariffs on sugar. So the multinationals got their way again. And this is what we have been fighting with Free Trade Agreements.

Certain people in Congress have fought very hard to try to get some adjustment by the Administration, unsuccessfully. I just wanted to make a comment for your response.

Dr. FEINBERG. Thank you.

Well, very specifically with regard to the U.S.-Chile Free Trade Agreement. The U.S.-Chile Free Trade Agreements does require both parties, the U.S. and Chile, to enforce their national laws with regard to labor and the environment. It's enforceable in the sense that if there is a finding through various panels that that is not the case, then the party would have to pay a fine, a monetary fine.

In the event—that is to say, there would not be a trade sanction, but there would be a monetary fine.

If the party did not agree to pay that monetary fine, then the other party, the offended party would have the right to impose a trade sanction at that point.

The emphasis is on enforcement of national laws. As you suggested in the case of Chile, the national laws were already pretty good; in fact, one could argue better even than in the United States.

With regard to environmental laws, actually, in order to—during the course of the negotiations the Chileans thoroughly revised their national laws with regard to the environment and considerably upgraded them. So I would say that was an advantage of negotiating a Free Trade Agreement.

What is missing—and I think perhaps this is what the Commissioner is referring to. In the U.S.-Chile agreement, and similarly with the other agreements that we've just been negotiating, country—the parties, the countries agree to—where national standards are below international standards, the countries simply pledged to seek to raise their national standards to international. Simply seek to.

That is to say, they are not obliged to. And in the event that they do not, that they do not, in fact, seek to, they do not strive to, then there are no sanctions in that case. And I think that has—that has, I think, correctly been criticized. That's rather weak language. I would just—one very quick point with regard to the sugar issue. Of course, the U.S. private sector, as we were discussing during the break, was very divided on this issue. The agricultural producers, some of them, of course, want to keep their protectionism, naturally. Some of the users of sugar, you know, the confection industry, for example, candy industry, you know, was disappointed. They would like to see more imports. I think this—of sugar and cheaper sugar.

This goes to, I think, one of the bigger issues we have in the United States, which is we no longer have a consensus on trade

policy. The country is deeply, deeply divided and we're in a situation in which it's very hard to put together a consensus and nobody wants to yield an inch. And every company, every trade association is in there just fighting tooth and nail. And we have a problem. In political science we'd say there's a problem of aggregation of interest. And it seems that the political parties and the U.S. Congress are not capable at this point of sort of aggregating these interests in the way that reflects a broad national interest. And I think this is a major problem facing the United States today.

Vice Chairman D'AMATO. Thank you very much. Commissioner Reinsch.

Commissioner REINSCH. Well, I just can't resist wading for 30 seconds into sugar and just observe for my colleague, Commissioner Becker, there were plenty of multinational companies that were very unhappy with the outcome of the Australian agreement.

The real multinational companies are in the confectionery business and in the sugar-consuming business, and they worked very hard to get an expansion of the quota and were very disappointed when they didn't. This was not a case of the multinationals all being on one side. My questions, however, are for Dr. Hanson, and I think there's only two, although that depends a little on what you say. You mentioned in the beginning as the economy evolves, the United States, as it has historically done, would move into new sectors and new product categories or areas to make up for the jobs that we were losing elsewhere. Can you give me some examples of what those new areas might be.

Dr. HANSON. We can look. Just within manufacturing, if you look where job growth was most active in the 1990s, it was in technology-intensive sectors. It was in electronics, it was in semiconductors and, also, in business services that were helping those firms export their goods and services.

Commissioner REINSCH. Well, that's services—okay. But let's be a little more recent than the '90s because a lot has changed since then.

The last three years, has there been a lot of job growth in the sectors you just mentioned, or is that where we should be looking for the future?

Dr. HANSON. No, I don't think so. We're in the midst of a shallow, but prolonged recession and a slow recovery. I think it would be a mistake to forecast from the trough of a business cycle what the next ten years are going to look like. Just like it would have been a mistake in 1990 to say that sluggish employment growth was going to characterize what we were going to see in the coming next ten years. The U.S. economy continues to surprise. And perhaps the most surprising thing about the 1990s was the return of productivity growth. That in the end is what makes us all better off. And in the absence of the capacity to generate productivity growth, standards of living in this country will stagnate.

Commissioner REINSCH. Fundamentally, I agree with a lot of what you're saying. I think the essence of the political debate in Washington is concern that what has been an historic evolution may have come to the end of the line. And that the politicians, at least, maybe not the economists, are having difficulty seeing where the next groups of jobs are going to come in the economy.

And I think that one of the things that's going to have to happen is that we're going to have to come up with better answers to that question, rather than simply saying that it's going to happen because that's what's happened before.

Maybe that's true, but I think—where is it going to happen, how is it going to happen are legitimate questions.

Let me ask you another question, if I may, in the remaining time out of complete and total ignorance, which I confess, which is what does investment—what does high levels of investment in human capital mean in practical terms?

Dr. HANSON. What that means, very simply, is raising average education levels, producing more college graduates and producing more college graduates.

Commissioner REINSCH. Okay. So what do we do? You're talking about education programs primarily? Training?

Dr. HANSON. Yes. I don't want to go on the record in terms of making specific recommendations for types of education programs. I merely want to draw attention to countries that have made successful transitions out of head-to-head competition with low-wage economies. The countries that have done so are countries that have seen rapid increases in the share of college graduates, in the share of engineers and other highly technically trained workers in the labor force.

Commissioner REINSCH. Now, that was a very useful example, and I want to study it. I asked the question because I give this speech all the time. In fact, I gave it last night here in San Diego. And I made the same comment about how we need to do more of this stuff. The problem for people in our business, which is not education, is to try to translate that into both dollars and cents and specific programs. That's what we want to do. We want to increase the level of education. How you do that seems to be a mystery. I think the country has something of a record of failure over the last decade in that regard.

Dr. HANSON. Let me make one point, which I think is often not fully appreciated. And that is, when—recognizing that the adjustment costs involved in dealing with expansions in trade and the spread of new technology have been large and important and impacted many parts of this country. When you slow down that adjustment process, you lower the incentives to make those investments in human capital. You hinder the ability of those new dynamic sectors, whatever they may be, to grow and develop.

That is, there are consequences from keeping workers locked in the textile sector. And that those consequences are other sectors that are more dynamic that have greater potential for productivity growth can't expand as quickly.

Commissioner REINSCH. Well, so you would support Dean Cowhey's suggestion that we give them all an annuity?

Dr. HANSON. Million dollars each?

Commissioner REINSCH. Not to put you on the spot or anything.

Dr. HANSON. No. But to come back to this issue of trade adjustment assistance, and here is where, you know, the typical line of economists is to say, look, they're gaining some trade, let's lower trade barriers and reap the gains from trade and let's not worry about where the costs get allocated.

I think a politically more realistic line has got to say, for those individuals who are going to bear the brunt of the adjustment costs, what can you offer them to make that transition easier?

There's been a fair amount of debate over the last ten years about whether the best way to do that is a very directed intervention in terms of retraining, or intervention that's much less directed and that involves mainly income transfers.

The research is—is—the jury is still out, but there's—a lot of the research is skeptical about the ability of government entities to judge where those retraining activities should be concentrated and that we might be better off with something that's not too different from an annuity; basically, income support for individuals who are stuck bearing the costs of these changes.

Commissioner REIN SCH. Thank you.

Vice Chairman D'AMATO. Thank you very much. Commissioner Wortzel.

Commissioner WORTZEL. Thank you. I want to focus on this same area, Dr. Hanson. It's an interesting one. And I really appreciate that your entire set of arguments has been really grounded in substantiating data, which we don't always hear when we hear these arguments on the macroeconomic level.

And although it's somewhat out of role for me to this type of question, I'm going to ask it because at one of the hearings that we had a group of union representatives and also, to get into political economy, the elected representatives, the congressmen from certain congressional districts.

And we listened to a very impassioned speech about constituents who essentially said, I grew up in rural Pennsylvania or in High Point, North Carolina. My parents grew up there. My grandparents grew up there. I want to raise my kids there. I don't want them to have to move off to some other place.

And I guess the answer I hear from you is: tough. Your kids are going to have to move, and you're probably going to have to get re-educated and move.

Now, that, from a macroeconomic standpoint, works great. From the standpoint of political economy in a congressional district, it doesn't sound like a real good solution, especially if you're trying to get reelected. So how would you respond to that congressman?

Dr. HANSON. So—

Vice Chairman D'AMATO. Are you running for reelection?

Dr. HANSON. Fortunately, not. I think we can forecast the success of my political career. We can find lots of examples of communities that have taken a very hard hit from greater exposure to trade. But not just greater exposure to trade; also, the fact that technology has left certain industries behind. Newsprint, because of changes in technology, is a production process that now involves virtually no labor. There are many communities that have been affected by that development, completely apart from trade. I think we can find examples, though, of communities that have made that transition and that didn't involve the children and the grandchildren having to leave. Pittsburgh is one example. It's hard to think of more of a—a better—a city that more exemplified the rust belt of U.S. manufacturing than Pittsburgh, which has found sort of new life in software, in electronics and other parts of high tech.

Now, did that happen because of directed government programs which said this is going to be Pittsburgh's future? No. It was an organic outcome that reflected the skill base that Pittsburgh had. It's got a concentration of excellent universities and individuals who saw opportunity, pretty skilled workers in an area where property prices were low and that was pretty depressed.

So that's—that's one example to say we can't tell you what the future is going to be, but what's the alternative? The alternative is constructing barriers that essentially keep workers in industries that are going to face competition from lower and lower wage economies.

And it's hard to see what the exit strategy from there is going to be except higher adjustment costs at some later point in the future.

Commissioner WORTZEL. Well, I don't know if you've written that paper, but I would suggest to you that a paper with those examples is going to have a great sort of intellectual market around this country.

Vice Chairman D'AMATO. Thank you very much. Commissioner Dreyer.

Commissioner DREYER. Yes. To some extent my question has already been asked by Commissioner Reinsch, but let me elaborate on it. I am getting the impression that a simple translation of the San Diego party is, don't worry, be happy. And since particularly Dr. Hanson and Dr. Feinberg seem to be congenital optimists, I will confess at the outset that I am basically a pessimist.

I am wondering when you say workers do find other jobs, even though it may take a while, what percentage of these workers are you talking about and what kinds of other jobs are they finding?

I would add to that, while I totally agree with you that we need to educate our youth out of this situation—in other words, we need to educate them better to compete technologically—I don't see it happening. And since I don't have my university's administrators sitting here to listen to me the way you do, I'm going to go out on a limb on this one and say probably in most places in the country it isn't happening.

We are not, by and large, educating our students to be more technologically ept. We are educating them in diversity. We are educating them on participating in campus sports. We are educating them in all kinds of things, but we are not pushing them toward math and science. Everyone talks about the need for diversity on the teaching staff. We have some departments at some universities that have no diversity at all. What is lacking is Americans, because there are so few Americans that have the necessary qualifications.

They departments are totally Indian and Chinese. And once this preponderance of non-American faculty members gets to a certain stage, you find your young Americans who are not Indian or Chinese being afraid of going into the department because they think they don't fit. What's happening? We have a math phobia among our high school graduates. And if you mention physics to many students, they cringe. And if that's not happening at your university, you should know it's happening in most other areas.

Dr. HANSON. I'm not exactly sure which—where the question was in there, other than just an—

Commissioner DREYER. Let me be very explicit in case you missed it. One, where are these people being retrained, and what percentages of them are being retrained? And, two, have you not noticed here that we don't seem to be very good at drawing young American students into the fields that you say we need to be better educated in?

Dr. HANSON. I had focused on the second part of your question and forgotten the first. On the issue of how or where workers get reemployed, let me refer you to a work by Lori Kletzer, who is an economist at the University—

Commissioner DREYER. Say it again.

Dr. HANSON. Lori Kletzer.

Commissioner DREYER. K?

Dr. HANSON. I can provide the cite to the Commission.

She's an economist at the University of California, Santa Cruz, who has looked at the issue of job displacement associated with trade. To generally sum up her findings, workers who are in industries that get hit by increased imports tend to suffer wage declines as they're pushed out of jobs in one sector into another sector.

The majority of them end up getting reemployed somewhere in manufacturing, but a substantial fraction leave manufacturing and work in services.

So the costs are real. And this is not to say—nothing in my remarks or I think in anybody—anyone else's remarks here is to suggest that these adjustments are cost-free. On the contrary, one of the basic tenets of international economics is that when you have greater integration between countries, there are going to be sectors that expand in benefit and there are going to be sectors that contract and that take a big hit.

The question is, how do you want to incorporate that transition? Do you want to put it off to a very distant date in the future? Or do you want to deal with these issues as they come up? Or do you want to recraft the way the United States fits into the world economy? Do we want to get actively involved in really insulating the United States from competition? Personally, I find that a scary prospect.

On the issue of math phobia, I can assure you that personally I do everything I can to encourage enthusiasm about mathematics, though I think with limited success.

Commissioner DREYER. And by the time they get to college, it may be too late.

Dr. HANSON. But I think—you talk about Americans in particular. The U.S. higher education has become an important export industry. We draw workers from all over the world to come to what is the finest collection of universities that one can find anywhere. I'm bragging slightly. But it's—I think it's important to recognize when we draw those individuals here, we keep some of them for a while. Sometimes for their entire lives. And they become important innovators in industries that are at the cutting edge of technological development. If you look at the development of Silicon Valley in the 1990s, who were some of the key entrepreneurs? They were engineers from China, engineers from India.

So if you ask me, does it matter whether it's Americans or people who've come in from abroad to help lead the U.S. economy into a new future? I don't know that I'm as concerned as long as that innovation is happening, that productivity growth is happening and those benefits are then being felt throughout the economy.

Commissioner DREYER. Thank you.

Vice Chairman D'AMATO. Dr. Feinberg, you had a comment.

Dr. FEINBERG. Yes. Thank you. Well, I appreciate being considered an optimist. I consider myself to be an optimist, yes, but a realistic optimist. So let me see if I can make a couple of relevant comments and also very much keeping in mind that your Commission's job is to look at the national security impact of U.S.-China economic relations in particular. In that light—first, simply with regard to the issue of adjustment assistance, of course, we have been debating this in the United States for a long, long time now. We have any number of programs for adjustment assistance in the United States, run for the most part by the Department of Labor and the Department of Commerce. The problem is these programs are terribly under funded, and there simply has—way, way under funded. And so, therefore, they don't have credibility. This is the big problem you have politically.

The unions and others, when they hear people talk about trade adjustment assistance, they say, yes, we have been hearing this for 20 years, and where's the beef?

So I think if the Congress and others are going to get serious about trade adjustment assistance in whatever form it may take, it has to be a serious budget item. And so far the Congress has not been willing to look at it in those terms. In terms of the job threat, however, it's been mentioned here in the previous panel, but I want to underscore. If we think there's a threat from China in terms of low-wage jobs, it's a much greater threat in the rest of the developing world.

For example, when the tariff—when the textile and apparel quotas are released at the end of this year, if, in fact, they are released, just in Central America alone there are 400,000 jobs dependent upon that sector. It was mentioned that the United States stands to lose 400,000 jobs in the sector. The United States has a labor pool eight to ten times the size of Central America. In other words, the impact of the potential loss of 400,000 jobs in Central America is eight to ten times the impact that such a loss in that sector would have in the United States. It could be devastating for the young democracies in Central America if all of those jobs simply pick up and go to China or other low-wage Asian countries.

And that's an area where we know from history, there's a direct national security interest on the part of the United States. So I do think we have to look very carefully. And, frankly, I don't agree that it's simply enough to say, well, free trade, you know, benefits everyone in the long run. There's an issue of speed of adjustment. Speed of adjustment.

And whether or not the developing world—where we have important economic and security interests, whether the developing world can withstand the onslaught of low-wage trade particularly out of China in the short term is something I think we do have to look at very closely.

So it's a national security foreign policy issue as much as it is a domestic economic issue. If I could just make two other points with regard to the national security issues and budgets.

It was mentioned in the last panel that the budget deficit is the primary driver, after all, of our overall trade deficit, which, in turn, is allowing particularly Japan and China to run up very, very large and rapid accumulations of U.S. reserve assets. That is to say, the U.S. dollar. That may be perfectly benign, and there may be a perfect and simple market adjustment. The dollar falls, perhaps U.S. interest rates may have to rise a bit. It may all settle out. But it may not, particularly if the budget deficits continue to balloon as all projections now suggest that they, in fact, will.

I, for one, wouldn't want to be running our national security policy with the thought that our leverage over China is significantly being reduced as they accumulate massive amounts of dollars. And although they probably wouldn't—just like, you know, people accumulate arms and they probably will never be used. Nevertheless, they have at least a psychological impact if China is sitting on 200 billion and rapidly rising reserve accumulation of U.S. dollars. So I think this is something for us to think about—the budget deficit, in other words—as a national security issue beyond simply the economics of jobs.

We have—we do not have in place—with Europe, for example, we have in place all sorts of mechanisms to deal with exchange rates and accumulation and banking systems. We've just begun to put those in place, for example, with the Chinese.

So I think we have to really look very carefully at this whole financial issue and dollar issue as very much part of our national security. And when you run large, continuing, booming budget deficits, we have to see the downside of that in terms of our national security. The final point, and just to maintain my reputation as an optimist, the price of many U.S. products—of many imports that we are importing into the United States has been falling and falling dramatically in the last 10 to 20 years. And a lot of this isn't really picked up in the consumer price index because the quality is improving or these products didn't even exist before, but they, nevertheless, improve our quality of life.

Clothing and apparel in stores today are cheaper than they were ten years ago, for example, not to mention the boom in electronics. That means that the real standard of living of Americans, including American workers—at least those that are employed or even if you just have a Social Security check. The real value of your—each dollar in terms of its purchasing power, in fact, is increasing.

And we do need to recognize that while we tend to focus on individuals as workers, individuals are also consumers. And this tremendous boom in trade from low-wage areas, although it certainly is a cost to some Americans as workers, is also a tremendous benefit to all Americans as consumers of these lower cost imported products.

Vice Chairman D'AMATO. Thank you very much. Commissioner Bartholomew.

Commissioner BARTHOLOMEW. Thank you very much.

Thank you to our witnesses. Generally I try to ask questions because I believe the purpose of these hearings is for us to get at the

benefit of your expertise, rather than share any that we might have. But I'm going to break my own rule and offer just three comments. One is that, since Commissioner Reinsch and I disagree more often than we agree, I wanted to agree with him on the concern as it's playing out in Washington, and just because something has happened in the past in a certain way, doesn't mean that it's going to unfold in the future the way it has.

And I think that some of the concern is that there certainly seems to be a speeding up of the process as globalization moves forward and escalation of job loss, and that is one of the points that is of real concern. The second one is it really strikes me, as we've heard all morning and I suspect it will move forward into the afternoon, that a lot of you really are talking about trade in an ideal world. It's a world of free trade that exists free of trade-distorting activities such as dumping, bogus phytosanitary standards, intellectual property rights. And when you factor those in, the issues become a whole lot more complicated. And, frankly, we have to factor them in. And third, Dr. Feinberg, specifically you mentioned two options. As I'm sure you know, there's a lot of skepticism about the effectiveness of these codes of conduct. It's been an issue that's been going on a long time. But I would like to put a third option on the table—what can help improve worker standards? And that goes, again, to a basic issue of freedom, and the right for people to organize independent labor unions. I believe that those would make an enormous difference in the ability of people to change their working conditions and make it a more competitive field for American workers.

That's it. Thanks.

Vice Chairman D'AMATO. Thank you very much. One more question, Commissioner Mulloy.

Commissioner MULLOY. Dr. Hanson, I'm sorry I didn't have your prepared testimony before the hearing. So I'm going to base my questions to you based on your oral testimony.

You noted that I quoted Mr. Mankiw, who is the chairman of the President's Council of Economic Advisors, and then discussed about outsourcing and about that being good for the American economy even though it's going to result in millions of jobs lost. According to the Forester prediction, we're going to lose 3 million white-collar jobs over the next ten years on outsourcing. Now, Paul Craig Roberts, who was an assistant secretary of the treasury under President Ronald Reagan, a Republican, and Senator Schumer, a Democrat from New York, have said that the theory of comparative advantage under Ricardo, which is the basis of all of the theory of free trade, is no longer applicable, and trade has now become a zero sum game because of the integration with these other economies. I don't know whether that's true or whether it isn't true, and so I'm looking for advice. But we did have a witness at our South Carolina hearing, not a laborer, but a CEO of a corporation who told us too often free trade has become an ideology among the American class of economists, rather than a strategy of what serves the national interest. So let me just follow up with that. You said that laborers get reemployed, that if a guy loses his job here, he's going to get reemployed somewhere else. The question is, does he get reemployed at a lower standard of living, a lower income for

him and his family? And if so, what are the implications of that for the American tax base on which, you know, we preserve our standard of living?

Dr. HANSON. Let me take your second question first. Again, citing the work by Professor Lori Kletzer at UC, Santa Cruz, the job loss associated with increased import competition, you find that on average workers suffer about a 15 percent hit in their wages when they're pushed out of one job into another. Now—

Commissioner MULLOY. So they get a lower wage in the new job.

Dr. HANSON. They get a lower wage in their new activity.

Commissioner MULLOY. And the tax base, then, is affected by that?

Dr. Hanson. Well, before we get to that point, I think it's important to recognize that that 15 percent hit is the same whether you lose your job because of increased competition from imports or increased competition from a competitor who is in a different state or because of other changes in the economy that adversely affect your firm.

There's nothing special about imports. When workers are forced out of work in a particular line of business, they tend to suffer a hit in terms of their income.

Now, in terms of thinking about the implications for the tax base, you've got to take into account that those opportunities for trade are creating higher incomes and job growth in other parts of the economy. Let me cite one example that's not related to China, but it's related to NAFTA. As we saw trade between Mexico and the United States increase in the 1990s and we saw increased outsourcing from the U.S. to Mexico, what did we see on the U.S. side of the border? An increase in manufacturing jobs of firms that produced parts and components that their Mexican counterparts then assemble into final goods and ship back to the United States.

That's an example of the sort of employment growth and wage growth that free trade brings about. If you want to think about the aggregate effect on the tax base, you got to sum up not just the guys who are losing their jobs and suffering wage hits, but also all those workers who are finding jobs at higher wages than they had before.

Commissioner MULLOY. Do either of you want to offer any comment?

Dr. HAGGARD. Yes. I want to go on the record with respect to the "don't worry, be happy" approach which has been characterized as the San Diego line, which I really don't share at all.

Vice Chairman D'AMATO. Is that the San Diego line?

Dr. HAGGARD. I would like to clarify my position with respect to the effect of trade and trade agreements on employment. We all agree that deeper integration has distributive effects. I think that's an axiomatic part of economics.

I think the concern is that trade policy is not the appropriate instrument for solving those problems. Even if trade is adding to adjustment difficulties that are caused by other factors that doesn't imply that by employing protectionist instruments that workers will, in fact, be beneficiaries.

And I'm not talking here about efficiency arguments. I'm not talking about job creation arguments. I'm just asking the question

whether, if we protect, do workers, in fact, pocket the gains from that protection? And I think we have a history of suggesting the opposite. Take, for example, the steel industry. The steel industry secured substantial protection during the '70s and '80s. What happened? The industry still lost roughly half of its work force during a period when you had substantial bilateral restraints imposed across a range of countries.

So my concern is not just with efficiency arguments: that there are overall welfare losses from protection. I am concerned that in the absence of a broader social policy, the union movement, the labor movement in the United States reaches for protection as a device for solving these other issues, but, in fact, it doesn't end up protecting employment.

We've seen this pattern repeatedly. It's happened in textiles, as well. Textiles have shrunk even in the face of the maintenance of the multifiber agreement. So I think that Dean Cowhey's comments were really important for the Commission's work and for U.S. policy as a whole. We can't look at the jobs question solely or primarily as just a trade issue. We have to reinvigorate the broader discussion of social policy in the United States to accompany the course of globalization.

Now, unfortunately—and this is my last comment on this—I don't think that the national level is necessarily the level of government that is most appropriate to handle some of these adjustment processes.

And what we see in San Diego or in Pittsburgh is that local institutions, partnerships between universities and firms, the local private sector working with local governments, may play a much more important role in making this adjustment more effective than anything that comes out of Washington.

That isn't a good message to carry to policymakers on the Hill or in the White House, but that may, nonetheless, be the case.

Commissioner DREYER. Thank you. This is very helpful.

Vice Chairman D'AMATO. Dr. Feinberg.

Dr. FEINBERG. Just as a reality take, I would point out that currently U.S. trade policy is stalled, very stalled. The WTO negotiations, the ministerial negotiations are dead. The effort to move ahead with the Free Trade Area of the Americas is badly stalled. The most recent negotiations last week broke down. And it's very questionable as to whether or not any of these smaller FTAs can now get through the Congress. The betting is that the administration will not try to put any before the Congress this year.

So we actually already have a deadlock in U.S. trade policy. I think that's important to have that as a starting point. Very often there's a view that, oh, we're moving ahead rapidly towards a more liberal, open trading regime. That's not the case. Trade policy is currently very stalled. I did want to respond, if I could briefly, to Commissioner Bartholomew's comment about codes of conduct, if you would. I agree that codes of conduct can be weak or strong, depending upon the code of conduct, and we should all strive for a high code of conduct that accords with ILO standards, and that, of course, would include the right of association and the right to form unions if that's what the workers—freedom of association and the right to form unions, which is what workers would want. For a

code of conduct system to work well, the workers, the managers, the supervisors all have to be educated in that code, which is not always the case. There have to be good, high-quality audits by external third parties who are objective and are doing a good job.

And then you have to have means for a corrective action. When there are problems cited, how are they going to be taken care of? I would suggest that if you have that sort of system and if it's comprehensive across a country or a region, that that does hold the promise for raising labor standards in developing countries if it's done properly. Thank you.

Vice Chairman D'AMATO. Thank you very much. I think this is a good way to conclude our morning session. I'm going to thank the panelists for your contribution, and we'll be getting transcripts of our session around to you for your editing.

Commissioner MULLOY. Commissioner D'Amato, can I just follow up one second. Dr. Haggard, I think you were absolutely right. I don't think trade policy is the total vehicle to deal with these problems. And I would hope the San Diego group under Dean Cowhey could help us maybe give some ideas on what is the appropriate—what are the elements of a strategy to help us deal with these problems that we have been discussing this morning.

Vice Chairman D'AMATO. Thank you very much. Thank you very much, Commissioner. That will conclude the morning session. And we will resume at 1:15. Panelists and invited guests are invited to lunch now. And I would also remind you that those that have asked for an open mike, we will have an open mike at the conclusion of the afternoon session. Thank you very much.

(Noon recess taken from 12:27 p.m. to 1:27 p.m.)

AFTERNOON SESSION, THURSDAY, FEBRUARY 12, 2004

OPENING REMARKS OF CHAIRMAN ROGER W. ROBINSON, JR.

Chairman ROBINSON. If we could please take our seats, we'd like to begin the afternoon session.

I would like to open the afternoon session, which is going to be most interesting after a very, very stimulating morning. We apologize for getting started a bit late, but I would like to turn over the proceedings for the afternoon session of this field investigation to our cochairman for today, Ambassador Robert Ellsworth.

PANEL III: BIOTECHNOLOGY PANEL

Co-Chair ELLSWORTH. Thank you, Mr. Chairman.

And thank you, Mr. Vice Chairman, for your leadership this morning.

So now we have a panel on biotechnology, and our panelists are Dr. Lee Zhong, M.D. and Ph.D., who is president of Elene Pharmaceutical Company; Dr. Kerry Dance, Ph.D., who is the managing partner at Hamilton Apex Technology Ventures, LP; and in the interest of full disclosure, I also am a partner in that firm.

Joe Panetta is the president and CEO of BIOCOM, which is the local San Diego biotechnology industry organization, if you will. And we have also on our distinguished panel Greg Lucier, who is the president and CEO of Invitrogen Corporation. And if I'm not mistaken, that is the biotechnology company in San Diego that has

the highest revenue—more revenue than any other biotechnology company in San Diego County. And his company is located in Carlsbad. So, gentlemen, thank you for coming. The procedure is—if you were here this morning you already know it, but I'll repeat it anyway. I call on each of the panelists in order, and each of you gives us a statement of seven or eight minutes' duration—no more than that, please.

And then we have a round of questions and answers between you and the Commissioners up here at the table. And each Q and A period is limited, please, to five minutes. And that includes both the Q and the A.

So, Dr. Zhong, may we invite you to lead off this afternoon, please.

**STATEMENT OF LEE ZHONG, M.D., Ph.D.
PRESIDENT, ELENE PHARMACEUTICAL CO.**

Dr. ZHONG. Thank you, Mr. Chairman and Mr. Co-chairs, and the vice chairman and members on the Commissions.

It's a great honor to be invited here today to talk about the China pharmaceutical industry and the China pharmaceutical markets, which is becoming more and more important in the world's pharmaceutical markets and industry. Now, China's pharmaceutical market during the past 25 years is one of the fastest growing world markets. And there was an annual growth rate of 17 percent.

In the year 2000 China's pharmaceutical market has a market size of 6.8 billion U.S. dollars, and it ranks as the seventh largest in the world. According to Table 1 on page 1 and—China's pharmaceutical market is going to become the fifth largest in the world by the year 2010. Now, the driving force for this market growth includes rapidly expanding national GDP, rising Asian population, increased access of general public to the healthcare products and the low per capita health expenditure. As we can see here on Figure 1 on page 2, China currently spends \$15 per person every year on healthcare products. This figure is much lower than the \$300 per person that the U.S. spends, and it involves a much lower than the \$50 figure spent by the second high development countries. So this leaves a huge load for future upward growth. China pharmaceutical industry consists of 6,000 companies. And it is obviously very fragmented because the top ten companies only represent less than 10 percent of the market shares while in the United States top ten companies have more than 60 percent of the market shares.

And the domestic Chinese companies consist of about 65 to 75 percent of the market share, and the following companies consist of 25 to 35 of the market share.

The industry is divided into three sectors, and the largest is the chemical drug sectors, which is—have about 65 to 70 percent of the market share. And the traditional Chinese medicine sector, which is TCM, takes about 20 to 25 percent of the market share. And the biotech is the smallest, which has about less than 10 percent of the market share. The chemical drug sector of the Chinese pharmaceutical industry has about 3600 companies, but half of them will be closed after year 2004 because of facing the fierce competition

from foreign drug companies and also because of not being able to—to meet the requirements of being GMP-compliant.

China is the second-largest active pharmaceutical ingredient manufacturer and supplier in the world. However, the products that Chinese pharmaceutical companies manufactures are mostly generic or copy the drugs; very, very few are innovative drugs.

Therefore, the Chinese pharmaceutical industry needs to invest in R&D to develop its own novel products. And it also means more management to increase efficiency and also needs to implement GMP system to enhance quality control. The second sector of the China pharmaceutical industry is the traditional Chinese medicine sector. It consists of about 1800 companies.

Since TCM has a long usage—long history of usage in China, it is accepted by many Chinese. And it is indeed effective in many chronic diseases with relatively fewer side effects. And it is also a niche market to many Chinese companies because it is without any competition from foreign companies.

However, the modernization of the TCM companies is also inevitable, which usually involves with product standardization and their GMP implementation.

The third sector is the biotech sector. Since Mr. Greg Lucier is going to talk extensively about this sector, sir, I'm going to skip that sector for now.

The foreign investment in China's pharmaceutical industry contributed greatly in the growth of the industry by bringing in capitol, management systems and technologies. By the end of year 2002, there's more than 1500 joint ventures established between Chinese companies and the foreign companies. The total foreign investments reached 3.6 billion U.S. dollars. And in year 2002 alone, the foreign investment is about 1.2 billion U.S. dollars. Until now about 19 of the top 20 largest multinational pharmaceutical companies have established a presence in China. And the foreign companies account for about one-third of the chemical and biotech drugs sold in China. Initially when they first started to do business in China, most of the foreign companies put focus on established manufacturer capacities by established manufacturer facilities. Now, these days it seems they also are start into establish R&D centers, as well.

And they're doing this to try to make use of the low cost of doing research in China. For example, in the United States—a research scientist in the U.S. research laboratory would cost about \$200,000 a year to do research. But an equivalent scientist in China will only cost about 50,000 U.S. dollars. The U.S. is the second-largest investor in the China pharmaceutical industry just after Hong Kong. And U.S. has shifted most of its APR production, about more than 70 percent, to overseas and a good portion to China. And the U.S. has also shipped a substantial portion of the generic finish-dose formula production overseas, but not to China yet; but I think within ten years it will go to China, as well.

The U.S. companies also have started R&D activity in China, but, in our opinion, it will be quite limited.

Before 1993 there was no intellectual property rights protection in drug products; but since then, IPR protection has improved significantly, especially after the WTO entry.

China has promulgated many laws designed to guarantee IPR protection and repealed about 2,300 laws incompatible with WTO requirements. China also applied a judicial enforcement, as well as an administrative enforcement. However, intellectual property in many areas is still a problem, especially in the enforcement aspects.

So in summary, China's pharmaceutical industry is evolving not only to be a dominant manufacturer powerhouse, but also to become a competitor in R&D.

Foreign investment and the transfer of technologies and management systems contribute greatly in the development of China's pharmaceutical industry. And the investment and joint venture's are mutual benefits. The foreign companies take over substantial Chinese markets and enjoy low cost while China gets capitals and technologies to modernize its industry.

There are several favorable factors for foreign investment, which includes government support, economic growth, low labor cost and the larger pool of talented scientists. And also, most recently, there's improved IPR protection. However, there are also some constraining factors for foreign investments. IPR is always an issue, especially in the implementation aspect. And there are certain administrative policies, such as strict price control of drug, which would cut the profit margin of the drug companies.

And, also, there's inefficient drug distribution channel in China, although recently it is improving.

And, lastly, there's multiple regulatory bodies in the pharmaceutical industry in China. So this possibly will make doing business in China little bit more difficult. Okay. Thanks. Just end there.

[The statement follows:]

**Prepared Statement of Dr. Lee Zhong, MD, Ph.D.
President, Elene Pharmaceutical Co.
San Diego, California**

China's Pharmaceutical/biotechnology Industry

China's pharmaceutical industry has been one of the fastest growing markets in the world during the past 25 years. Parallel to other sectors, pharmaceutical industry has undergone major changes, including consolidation and privatization of the state- and collectively-owned enterprises and an ever-increasing presence of the multinational pharmaceutical companies. China's entry to the WTO has promised even greater growth for its pharmaceutical industry.

Industry Overview

China's pharmaceutical market has been enjoying its dazzling growth over the past 25 years. According to China's State Economic & Trade Commission, the average annual growth rate was 17% from 1978 to 2002, with estimated growth of 15% in 2003. The market for chemical drugs was worth around US\$ 6.8 billion in 2000 at ex-factory prices, which ranked seventh in the world (see Table 1). It is estimated that China's pharmaceutical sector will continue to grow at double-digit rate over the next few years and become the fifth-largest market in the world by 2010 (see Table 1). China has emerged as one of the leading players among the pharmaceutical markets of Asia. Its market size and potential dominates the region. According to the International Medical Service (IMS), China will be the leading pharmaceutical market in Asia ex-Japan by 2005, with a projected 34% share.

Table 1. China Will Become the Fifth-Largest Pharmaceutical Market
Estimated Chinese pharmaceutical market (US\$ billions)

1996 Top 11		2000 Top 10		2005 Top 10		2010 Top 10	
United States	91	United States	150	United States	262	United States	466
Japan	52	Japan	58	Japan	65	Japan	81
Germany	20	Germany	17	Germany	24	Germany	37
France	18	France	17	France	21	France	28
Italy	10	United Kingdom	11	United Kingdom	16	China	24
Brazil	8.4	Italy	11	Italy	15	United Kingdom	24
United Kingdom	8.2	China	6.8	China	14	Italy	23
Spain	6.0	Brazil	6.7	Brazil	10	Canada	17
South Korea	4.5	Canada	6.3	Canada	10	Spain	16
Canada	4.3	Spain	6.2	Spain	9.8	Brazil	15
China	4.3						

Source: BCG analysis

Many factors are contributing to the fast growth of the industry. First, China has maintained political stability for the past decade. The government has been playing its part to help China's pharmaceutical companies. Second, rapid and healthy economic development has strengthened the sector. The growth rate of GDP was 9.1% in 2003, with an average 8% annually for the past 20 years. Adding to the growth, foreign investment was strong, reaching US\$ 53.5 billion in 2003. Third, a rapid growing aging population (over-65 population: 4.4% in 1975, 7% in 2000, estimated 16% in 2030) and rising personal income has boosted the demand for pharmaceutical products. Lastly, the new technology development has also stimulated the industry.

Besides the above factors that will continue to influence the pharmaceutical industry, healthcare system reform, which expands the general public's' (such as peasants in remote countryside) access to healthcare, will play a key role in the development of the sector.

Industry Compositions

There are approximately 6,000 pharmaceutical companies in China, of which 3,600 are chemical drug companies and 1,800 traditional Chinese medicine (TCM) ones. The market is highly fragmented, with top 10 companies only represents less than 10% of the market. The domestic companies share 65–75% of the market, and rest belongs to foreign invested companies and the imports. The chemical drug sector is the largest, with its output value make up 65–70% of the entire pharmaceutical industry, the TCM sector 20–25% and the Biotechnology sector less than 10%.

Chemical drug sector

China's modern pharmaceutical industry started in 1949 after the Peoples Republic of China was founded. In order to provide low-cost medicines to people, China invested heavily in pharmaceutical chemistry research. It aimed to imitate new drugs developed in the west and to develop more economical manufacturing process. This explains the characteristics of China's pharmaceutical industry: strong in bulk pharmaceutical manufacture and weak at discovering and developing innovative drugs.

Despite rapid growth, the range of Chinese drugs is limited and tends to focus in generics and pharmaceutical chemicals. Drug market profile is 15% over-the-counter (OTC), 62% generic, 14% branded generic and only 9% patented. Majority of the companies lack innovative R&D. 97% of synthetic medicines produced are copies. There is considerable duplication of production which results over-capacity.

Despite of the problems of finished-dosage forms (FDF) sector, China has become a major player in the international bulk pharmaceutical market, owing to a large pool of pharmaceutical chemistry experience and talents as well as low labor cost (a tenth of that in the US). China exported 90% its bulk pharmaceuticals (active

pharmaceutical ingredients and intermediates), with the major markets being the EU countries and the USA. By the year 2000, China has become the second largest manufacturer and supplier of bulk pharmaceuticals in the world, with an output of 537,000 tons of 1,500 different kinds of chemicals.

Upon the WTO entry, China's pharmaceutical companies have been pressured by the compliance requirements of "Good Manufacturing Practice" (GMP, a set of global industry standards for the medicine manufacturing process) and stricter restrictions on producing pirated drugs. The domestic drug companies were forced to change in recent years, mainly in two aspects: modernization and increase investment in research and development (R&D). Many companies have to evolve to survive the competitions from other companies, domestic and multinational, and to survive the new laws and regulations. The industry is also expected to change significantly owing to an increase in consolidation, alliance and acquisition.

More and more companies are investing to upgrade their facilities for international regulatory compliance, especially for FDA approval. Steps have been undertaken by the Chinese authorities to encourage rationalization. Government required all companies to comply with standards of GMP by June 30, 2004. The number of the pharmaceutical companies is expected to reduce by half as a result of the policy.

In the past, domestic companies paid little attention to drug R&D and instead focused on generics or pirated drugs. R&D expenses represent about 1% of their total revenue, against 15-20% in US. Due to the strengthening of Intellectual Property Rights (IPR) protection, companies are under the pressure to undertake innovative R&D, although the "R&D" conducted by the companies is often meant in the sense of producing higher quality products, with new formulations and indications. R&D spending of some companies has gone up to 5% of sales revenue. Many companies entered into strategic alliances with research institutes and universities since lacking their own facilities.

TCM sector

TCM has played an important role in the health care of Chinese and other oriental countries for thousands of years. TCMs are generally used for chronic diseases and many are OTC products. They tend to have fewer side effects. There are 1,800 TCM manufacturers in China, with majority of them small or medium in size. Many of these companies have old machines. A major problem for TCMs is lack of standardization.

Government policy has promoted TCMs to be one of the fastest growing businesses in the Chinese industry. Authorities designated TCM as special priority for industrialization and attempt to push TCM into international markets. TCM R&D are on two tracks, one is through the purification and standardization of TCM, the other is through the identification and purification of the active element(s) and development of small molecules, new chemical entities which may mimic the activity of the original product. The latter track presents opportunities to identify and produce novel Western-style medicines.

TCM sector has generated little interest from multinational drug companies. The reasons include their current drug discovery practice, past disappointing experience with natural product screening and concerns over the IPR of TCMs.

Biotechnology sector

China has the capabilities to manufacture over 300 biotechnological products, including antibodies, vaccines, diagnostic reagents, etc. However, most of the products are generics—copy complex molecules by molecular cloning.

Although China has conducted cutting edge biotech research, it lacks product-oriented R&D. This phenomenon is mainly caused by the original planning made half century ago. Basic research has traditionally been the responsibility of research institutes and universities. China has a number of world-class scientific biomedical institutions—the North and South Genome Centers, the Institute of Materia Medica, Tsinghua and Beijing Universities, etc. China has over 300 research institutes and 50 early-stage companies for biotechnology and more than 30 of the 150 state key laboratories are focused on biopharmaceutical-related projects. Like chemical drug sector, we saw more biotechnological research undertaken in the industrial sector in recent years. However, most innovative researches, especially the upper-stream ones, are still conducted in the research institutes and universities.

China has a large pool of knowledgeable scientists. There are some 200,000 researchers specialized in biotech R&D in China, some of them well trained overseas. A web of personal contacts with Chinese scientist working overseas also helps facilitate the transfer of ideas, personnel and funding back to China.

One of the main reasons for the rapid growth of the sector is that the Chinese government has paid high attention to its development. Many funds have been set

up to finance biotech R&D, including the National Natural Science Fund, the “863” High-Tech Program and the Five-Year Plans. China has targeted biotechnology as one of the six key industrial technologies intended to fuel growth in the economy. Major investments in a number of major cities in China, including Beijing, Shanghai, Shenzhen are contributing to a growing interest in biotechnology joint ventures with western organizations as well increasing demand for biotechnology related products. As a result, there are many biotech industrial parks been built, which features collaboration of state research institutes, universities, and companies.

One reason for the lag of industrialization of biotechnology, despite the impressive development of biotechnology research, is the scarcity of venture capital for new companies. In the past, the funding for domestic R&D was direct government support to state-owned research institutes and companies. Therefore, it made impossible and unnecessary to build a sophisticated venture capital market that enterprises hold the full risk and reward benefits. Authorities are taking steps to build a venture capital market; its result remains to be seen.

Biotechnology Capabilities

Biotechnology is the fastest growing sector in the past 30 years. Despite a late start (70's) for its biotech development, China has made rapid progress in recent years and stands, in some areas at the international level. For example in gene mapping, transgenic technology for animals and plants, gene therapy technology, stem cell research, gene chips, etc. Listed below is a few areas.

Human genome research

Since the launch of Human Genome Project in 1994, China has achieved great success. It has built three top-ranked national genome centers. It was one of the six countries participated in the Human Genome Plan; together they sequenced the entire human genome. China's human genome research has already been equipped with first-rate equipments and talented professionals. China is the most populated country in the world and its population is composed of many ethnic groups that are relatively isolated. This provides a precious genetic resource for studies on human genome diversity and evolution, as well as for hunting of human disease related genes. China is also carrying out genome projects of other species, such as rice, pig, etc.

Genetically-Altered Plants

China has been actively involved in agricultural biotechnology applications research for more than 15 years. It was the first country in the world to grow genetically modified crops when it planted transgenic tobacco in 1988. The need for technology to improve yield and food quality is essential in order to meet growing population demands. The rapid growth in the area also was helped by the limited opposition to the development of genetically modified organism foods in China, when compared with western countries. Scientists are working on various crops, vegetables and fruits. Research has somewhat slowed down due to increasing public opposition.

Gene therapy

China has scheduled to commercially launch a gene therapy, Gendicine, for treating head and neck squamous cell carcinoma. The product was developed in a biotech company in Shenzhen, Guangdong, and was licensed for marketing by China's State Food and Drug Administration (SFDA). It is the first such clearance worldwide for any gene therapy.

Animal cloning

The first successful cloning in China was reported on June 22, 2000, a sheep called “Yang Yang”. The fourth generation offspring of “Yang Yang” was born on February 6, 2004. In March 2002, they also reported the success in cloning a colony of cattle using fully differentiated somatic cells. This achievement was accomplished by Chinese scientists independently; it was a team of scientists at the Chinese Academy of Sciences Institute of Zoology and Zhongda Embryo Engineering Center. It was believed cloning technologies could be beneficial to future milk industrialization.

Foreign Investment

Overview

China opened its pharmaceutical industry to foreign investment a couple of decades ago. Most multinational companies now have a presence in the market. While domestic players produce generics, foreign companies make or import their branded drugs. By the end of 2002, 1587 joint ventures (JV) have established in China, with investment totaling US\$ 3.6 billion. 40% of all Chinese pharmaceutical enterprises

have utilized overseas capital. Among foreign companies, Xi'an Janssen Pharma (a Johnson & Johnson's JV), Smithkline Tianjin and Sina-America Shanghai Squibb Pharma are the leading ones. Joint ventures and imported products accounting for roughly half the market in Shanghai and at least 30% of the nationwide market for synthetic chemical pharmaceuticals.

In the past, although China opened its door for foreign companies, there were many unfavorable practices that hindered the development. Frequent policy changes, strong domestic protection, disregard for intellectual property laws, low profit margins and inefficient channels of distribution are common complaints of foreign participants in the market. Upon joining the WTO in late 2001, China has made improvements in the intellectual property environment, lowered tariffs and gradually opened its drug distribution and hospital sectors to foreign participation.

The new laws/policies/regulations provide better environment for international companies and increase the attractiveness of China's pharmaceutical market. The foreign investment has increased. For example, Bayer Materials Science, the multinational chemical giant, announced in November 2003 that for the years up to 2010, they would allocate 75% of its global strategic investment to the construction of production facilities at Caojing, Shanghai. The total investment is expected to be US\$ 3.1 billion.

Trend

Although the average of tariff rates on imported drugs has been lowered significant after WTO accession, we do not expect to see dramatic increase in drug importing. Because of low cost labor, foreign companies prefer to continue their manufactures in China. Plus, most of multinational drug companies have already built their plants in China, some even their R&D divisions.

The multinational pharmaceutical companies are increasingly conducting R&D in China, by collaborating with domestic research institutes and companies or by establishing their own centers. It is in the mutual interests of both sides. While Chinese need help in identification and development of innovative drugs, foreign companies enjoy the low cost. The average cost of a chemist in a US contract laboratory is US\$ 200,000 per year, with an equivalent chemist in China costing US\$ 50,000.

The State Economic and Trade Commission (SETC) supports foreign pharmaceutical companies in expanding their business from manufacturing to R&D, and setting up centers to develop new products together with domestic institutes and hospitals. Foreign-funded research centers would be exempt from import tariff and custom taxes; business taxes would also be exempt if foreign companies transferred technology to China.

Concerns

There are multi-level regulatory bodies in charge of the whole system. The State Food and Drug Administration (SFDA) oversees the whole industry including setting regulations & policies and Evaluation and approval new drugs, generics, and imported drugs. The State Development and Planning Commission (SDPC) sets drug prices. The State Economic & Trade Commission (SETC), along with SFDA decides which drugs are eligible for reimbursement. It forces foreign companies to keep solid relationship (*Guan Xi*) with these government bodies, which requires a huge input of time and resources. It can also be difficult for foreign companies because of the culture barrier.

In order to provide their citizens with affordable medicines, drug prices, including those of drugs on the basic reimbursement list and patented drugs, are regulated strictly in China. Many drug makers are forced to make difficult decision to either keep the price high and off the list of reimbursement, or cut the price to be included on the list. Furthermore, relevant government bodies are generally encouraging, sometimes commanding doctors to prescribe low-cost generics. This works against multinational drug companies, most of which sell high-end branded drugs at premium price.

There are also fears that China's economy is overheating and concerns of whether the Chinese currency Yuan will be devalued.

Intellectual Property Rights Protection and New Drug Regulation

Before the reform of patent laws in 1993, China did not acknowledge intellectual property of medicines and no patent was granted for the innovative drugs. After 1993, China agreed to provide administrative protection for certain patented drugs in China. However the execution was problematic. The data submitted to the SFDA as part of the approval process was often intentionally leaked to domestic companies, which allowed domestic producers to use information to gain marketing authorization for copied version while foreign companies were waiting for their approval.

Since its accession to the World Trade Organization (WTO) in December 2001, China has built up a relatively good intellectual property rights (IPR) system by promulgating many laws and regulations in field of IPR. These include the Patent Act, Trademark Act, Copyright Act, and Trade Secret Act. China has repealed a total of 2,300 laws and regulations that were deemed incompatible with WTO requirements. China regards IPR protection as very important to the pharmaceutical industry.

For new drug registration, China has issued relatively good administrative laws and regulations. Its latest version, which published after China's accession to WTO in 2002, is compliant with international standard. Among these were regulations expected to bring requirements for local and imported drugs more into line, reducing average approval times.

China has achieved a great deal in IPR system within the past decade, especially in recent three years. However, IPR remains a serious problem. There are several problems involving administrative protections, the relationship between medical registration and patent protection. Foreign companies still complain about losses from counterfeiting. We believe the main problems are underdeveloped awareness of domestic companies and insufficient obedience in some local regions. Of course there are rooms for intellectual property laws and relevant regulation policies to be fine tuned.

Summary

China's pharmaceutical industry is evolving. Chinese government appears to be determined to build the country into a major player in the sector. Through a number of important measures introduced, China has started to establish a firm base on which to develop a globally competitive research-based pharmaceutical industry. The rapid economic growth and increasing demand for medicines will stimulate sector's growth.

Because of implementation of GMP and tightened IPR protection, we expect to see increasing consolidations of domestic companies. As a result, the capacity and capability of domestic sector will be heightened. Modernization of the generics and traditional Chinese medicines sectors will be undertaken. And biotech industry will likely to evolve towards industrialization. It is possible to imagine the appearance on the global scene of novel Chinese-originated medicines.

The market presence of multinational pharmaceutical companies will continue to be in the mutual interest of both sides. Because of the current favorable environment for foreign investment, we expect to see foreign companies to increase their investment, not only in drug manufacturing but also in R&D. Foreign companies would also have a better opportunity to gain a greater share of the Chinese market.

Co-Chair ELLSWORTH. Thank you, Dr. Zhong. Dr. Dance, please.

STATEMENT OF KERRY DANCE, PhD., MANAGING MEMBER HAMILTON APEX TECHNOLOGY VENTURES, LP

Dr. DANCE. Okay. Thank you members of the panel and, Bob, of course, for getting me roped in.

I do represent the venture capital industry, which is very strong here in San Diego. So let me just take a second and say, what is venture capital?

It's basically the bridge between somebody that has an idea, he's put some time and money in, he may have got government grants, but he now wants to form a company, but he doesn't have any profits. He can't go to a bank and get any money. That's where venture capital steps in and funds. It's intrinsically a high-risk, high return—we hope high return—kind of business because we're investing before sales, certainly before profits and often before there's even a product.

It's also a little bit of a cutthroat business. And the companies that come to us often refer to us as vulture capitalists as opposed to venture capitalists.

There have been many studies, though, that show the single-most important dollar for putting forth to getting wealth and jobs

is the venture capital dollar. You get tremendous leverage out of it.

This fact has been recognized by the U.S. Government. The Small Business Administration has a program that provides funds to venture capitalists under the so-called SBIC Program, and Hamilton is a hundred-million-dollar SBIC fund. We are one of those groups that gets part private capital and part from the government. Right now there are about 1500 venture capital firms in the United States that represent about \$10 billion a year investment. During the peak of the dot-com phase, that was \$80 billion a year.

It's a hallmark of the United States. There really is no other country that has the venture capital structure of the United States. It goes with the innovation of this country. Most major biotech start-ups that you see now had initial venture capital funding to get them started. Amgen, Genentech—those very large wealth creators and job creators had venture capital in their beginning. It's not been overlooked in many other nations that you tend to get a lot of wealth and a lot of jobs out of both biotech and venture capital, and Asian nations are trying to emulate the USVC structure.

Korea, in particular, made a significant government effort several years ago towards creating a venture capital structure in Korea. It was not very successful.

One of the problems is that to have venture capital be successful, you have to have a lot of innovation. You have to have a lot of ideas to look forward. You have to have a lot of management, people that have run entrepreneurial companies. You have to have the money. And you have to have ways to getting an exit. If those things all don't coincide in one place—and they didn't in Korea—you can make investments in VC; you can't get your money back. It fails.

So Korea is now investing—allowing investments, which they didn't initially, in U.S. venture capital firms to kind of learn the business more and to realize to deploy their money, they have to put it again in areas. That, by the way, is a hallmark, also, of the United States. The successful VCs tend to be very clustered in areas that have the innovation and the people and all that. So most of your VCs are in Boston, the Bay Area, and San Diego. It's hard to make big VC business in Fargo. There just are not all the attributes there. China has been very interested in biotech, in particular in the VC business in general. It has no formal program such as Korea. However, it is allowing people and individual investors—the largest single investor in Hamilton's fund is from Mainland, China.

Biotech interest in China. China, as previously mentioned, has largely been overlooked by Big Pharma because there was no IP protection in pharmaceuticals, and in biotech IP is king. There is new interest in China now by biotech firms here, both looking for traditional Chinese medicine and trying to find out why it works and making a western drug out of it.

It's also a large market, as mentioned. There's 10 percent of the Chinese that can afford to pay more than \$15. Can afford to buy western medicine. And 10 percent of China is, in fact, a very big market. And it's a very big pool that several companies are looking

at as a place to do trials, get a lot of people and do trials a lot cheaper in big pharma trials.

So there is going to be a convergence of U.S.-China interests. I expect to see more biotech involvement in China, biotech and pharma, and more investment by China in biotech here in this country to learn and to get a foot in the door.

And China will continue to probably make some investments in the USVC structure, venture capital structure, but I don't think anything is going to come quickly that really has them set up, the kind of structure that we have in the United States at a formal government level.

What about investor influence on U.S. venture capital? First, in the venture capital business, the people that give us money really have almost no influence on what we do. It's kind of—by the legal structure, they cannot make fund decisions.

Our companies that we fund make very limited disclosures to the investors. They don't give away proprietary information. And, quite frankly, a Chinese investor is not a primary investor. Getting CalPERS or something like that to invest in your firm is about power, clout. CalPERS might be able to get some special rights; right now Asian investors won't. Co-investment rights for the limited partners to get special interests or something, a company, are not given in general because that potentially ruins the value of our investment. We do have co-investment rights with investors. And one—our Chinese investor has co-invested in a company that's doing a cancer drug development with us; but, again, he has no special rights in the company.

Some of the questions that obviously come up is, will China continue and move forward in honoring biotech IP? Are the Big Pharma companies and biotech companies here going to feel really comfortable to move into the market and have their patents protected? And how fast is China going to represent a market?

Everybody's looking, and obviously, everybody would like to sell more in China, help to balance the trade. How fast is it going to happen? And then how fast has China learned? Is it going to turn around and bite you on the other side? That besides being a market, they suddenly are a major competitor. Whether China is going to try to create a venture capital structure to emulate the U.S., I think that will come, but I don't think that's going to happen in the next several years. And what are the security concerns of biotech? Biotech in particular offers probably more hope than a lot of things for all of us that are getting older and getting all kinds of diseases. You're seeing an amazing convergence of science and technology to help us all out across the board.

On the other hand, like all technologies, it can be misused. And almost all those biotech innovations can potentially lead to bioterrorism kind of things.

And so as China moves into the whole biotech field, can we get the benefits, can we get the market or what are the risks that come with that? That is a question.

Thank you.

[The statement follows:]

**Prepared Statement of Kerry Dance, Ph.D.
Managing Partner, Hamilton Apex Technology Ventures, LP**

Kerry Dance, Ph.D.
Managing Member
Hamilton Apex Technology Ventures, LP

**“China as an Emerging Regional and
Technology Power: Implications for U.S.
Economy and Security Interests”**

Thursday, February 12, 2003



WHAT IS VENTURE CAPITAL?

- Venture Capital (VC) is the Bridge between grant funding and/or sweat equity and a final company
- Venture Capital is intrinsically a High Risk/High Return type of investing
 - Invest usually prior to sales, almost always before profits, often even before a product.
- Many studies have shown that Venture Capital dollars are the most effective dollars at creating jobs, companies and wealth.
- U.S. Government recognized the importance of Venture Capital and the Small Business Administration (SBA) created a program to fund Small Business Investment Company (SBIC) Venture Funds. SBA provides up to 2/3 of the money for U.S. SBIC VC Funds.
- Hamilton is a \$100M SBIC Fund.



VENTURE CAPITAL IN THE U.S.

- There are about 1500 VC firms in the U.S. at present representing some 10 Billion Dollars in investment per year.
- Venture Capital is a Hallmark of the U.S. Few other countries have anywhere near the VC structure of the U.S.
- Most major Bio-Tech Companies were started with VC funding including Amgen and Genentech.

VENTURE CAPITAL AND ASIA

- Some Asian Nations are trying to emulate the U.S. VC structure.
- Korea, in particular, put a lot of money towards creating a VC structure.
 - Initial Internal VC funding in Korea was not very successful.
 - Need innovation/management/money/liquidity in concentration to work well (U.S. Bio VCs are concentrated in Boston, Bay Area and San Diego)
 - Korea has created their own SBA equivalent program.
 - Korea now allows offshore investment in U.S. VCs to learn.
 - China has an interest in Bio-Tech in particular and VC business in general.
 - China is not as far advanced as Korea in VC structure
 - However, Hamilton's largest private investor is from China

BIO TECH INTEREST IN CHINA

- China has traditionally been overlooked by Pharma because of lack of IP protection.
 - Bio Tech/Pharma depend upon IP protection
- New Interest in China
 - Chinese traditional medicine being searched to find active components for classic western drugs.
 - Chinese market for western medicine is opening and can be larger (10% of Chinese can pay for western medicine, i.e. >100 million person market)
 - China offers a large patient pool with possible low cost for doing clinical trials. San Diego VC funded company was first startup company to do trials in China.

CONVERGENCE OF U.S./CHINA INTERESTS

- Expect to see more Bio Tech involvement in China and more investment by China in Bio Tech.
- China will probably make some investments in U.S. VC structure.

FOREIGN INVESTOR INFLUENCE ON U.S. VENTURE CAPITAL?

- Investors (limited partners) in VC firms have very limited powers.
 - Limited partners make no fund decisions.
 - Funded companies make few disclosures to the limiteds.
 - Chinese or other Asian Investors are not considered leading investors in U.S.—wield no major power.
- Co-Investment Rights for limited partners provide access—but special blocking rights are not given to any “strategic” investor.
- Co-Investment Rights are only given on an as available basis.
 - Hamilton’s Chinese investor has co-invested in one cancer drug development company. No special rights or technology access was given.

QUESTIONS TO BE ANSWERED

- Will China honor Bio Tech IP?
- How fast will China move from traditional medicine to western medicine?
 - Huge market for U.S. or not?
- Will China try—and could China succeed—in becoming major Bio Tech competitor?
 - Major competition to U.S. Bio Tech which is a major economic driver?
- Will China try to create a domestic VC structure to emulate U.S. or invest in U.S. VCs to gain access to Bio Tech?
 - Can we have benefits without undue risks?
- What are the security concerns of Bio Tech? At present Bio Tech is a major factor in saving lives, improving quality of life but Bio Tech may lead to knowledge that can be used for Bio Terrorism.

Co-Chair ELLSWORTH. Thank you, Dr. Dance.

Commissioner Becker and Commissioner Wortzel have indicated that they have a question, but I think, unless you really want to intervene here very briefly, I think I will just move on down the table.

What do you say? Okay. Mr. Panetta.

STATEMENT OF JOSEPH PANETTA, PRESIDENT/CEO, BIOCOM

Mr. PANETTA. Thank you, Chairman Ellsworth, and members of the Commission. It's a great pleasure to come before you this afternoon and to be here with this panel, as well. As Commissioner Ellsworth said, I'm president and CEO of BIOCOM. BIOCOM is the largest regional and state association for the life sciences industry in the country. And we represent some 500 members here, member firms, with about 500 companies in San Diego involved in biotechnology and biomedical science. We represent the third-largest cluster of biotechnology in the United States, following the Boston/Cambridge area and the San Francisco Bay Area.

The industry here in San Diego is relatively young in comparison to the other clusters. We got our start about 25 years ago, but it's only been within about the last 15 years that we've seen an exponential growth in biotechnology companies here in San Diego.

Along with that lack of maturity of our companies comes a lack of global penetration in terms of having products on the market and global partnerships.

So one of the objectives of our organization, BIOCOM, is to position this region's life science industry on the global stage so that we can achieve individual success within our companies and collective success for the biotechnology industry in San Diego. We believe that there is greater opportunity in terms of research and technological innovation here in San Diego than in the other clusters and in the development of the products that these companies are creating to improve health and to improve quality of life.

So what we're doing here in San Diego with our member companies and member firms through this association is to focus on an environment where we can have legislative policy, regulatory action, resources, economic conditions and a public awareness globally that will influence the further growth of the biotechnology industry. As you've heard from our other panelists, we expect to see health care change dramatically in the 21st century as a result of biotechnology and leveraging the successes that we've seen, particularly with the sequencing of the human genome.

And scientists here in San Diego and all over the world in biotechnology are working to better understand gene structure, gene function and the interactions between genes. So we look at this 21st century as the age of biology. And we feel that we probably have an entire century here of work that we can do to further create products through the technology that our industry offers.

Success means, as you've heard, delivering products to patients, improving health, and improving quality of life. And it's not only in the field of medicine; biotechnology has broad applications in the industrial sector, in the agricultural sector, in the environmental sector and others, as well.

We haven't had much direct experience in the development of the biotechnology sector in China. So I'm really not able to characterize much for you in terms of San Diego's experience in China. But I can tell you that our interest in China is becoming significant, and it will continue to develop in the future with the development of our global marketing interest as BIOCOM. Within the past few years here we have seen the presence of a number of delegations from throughout China with an interest in investing in San Diego, in partnering and licensing technology and, as Dr. Zhong said, in accessing the innovation that is going to be required in order to continue to grow the industry that China hopes to grow.

While in the past China's healthcare system has not been viewed as one of tremendous potential for pharmaceuticals and even for biotechnology products, as Dr. Dance said, this is changing with the rise of a more affluent class within China. And regardless of the fact that government subsidy doesn't provide the level of reimbursement that we might see here in the United States and in Europe, in Japan for biotechnology products, the level of affluence there provides greater opportunity for the population to access these drugs on a per-capita basis that rivals the United States and rivals Europe, as well. So we certainly see greater opportunity there. Since the mid 1980s, in surveys that have been done relative to health care in China and the prevalence of disease in China, what we've seen is that it's similar to the industrialized world in terms of cancer, cerebrovascular diseases and cardiovascular diseases, as well. And some of the most prevalent forms of cancer also are similar to the other areas in the world, such as lung, liver, and esophagus. And China has also recognized, we know, that the threat of AIDS is a global threat and joined in that global fight against the disease. All areas that the biotechnology industry is working to develop products in.

What is attractive to this industry is to be able to expand into regions of the world where price controls will not negatively impact market opportunity.

As you may know, this is an industry that requires tremendous investment. The average cost of bringing a new drug to market varies somewhere between \$500 million and \$800 million, and that investment is over the course of 12 to 15 years. Now, with patent protection of 20 years from the date of application for a patent, that doesn't allow for a lot of time for return on the investment. So the importance of free market economy comes into play tremendously. The other issue that comes into play tremendously here is that of intellectual property protection. And I won't reiterate what has already been said on that issue. We know that China is making tremendous strides in terms of changing laws to further ensure intellectual property protection, but our concern there is enforcement and whether there will be the degree of enforcement that's necessary to protect these valuable intellectual properties and inventions that are the lifeblood of biotechnology companies remains to be seen. So that's a great interest to us and great concern to us, as well.

I appreciate the opportunity to come before you this afternoon. Those are our main issues. We do see tremendous opportunity here and look forward to your questions. Thank you.

Co-Chair ELLSWORTH. Thank you, Mr. Panetta. Mr. Lucier, thank you for coming down and joining us, and we look forward to hearing from you now.

**STATEMENT OF GREG LUCIER, PRESIDENT/CEO,
INVITROGEN CORP.**

Mr. LUCIER. Thank you, Commissioner. My name is Greg Lucier. I'm president and CEO of Invitrogen, which does roughly one billion dollars a year in sales in tools and technologies supporting biotech research all over the world. We're based here in San Diego, and we're one of the largest biotech companies in terms of market capitalization in the world. To give you my perspective, we do export into China millions of dollars a year of tools and technologies to support their biotech research, and we have a very large team across China on the ground supporting our business there. What I can do is provide you a perspective on biotech research and what's going on in that country in terms of their development of this industry as a direct participant.

It began, as you know, about two decades ago as part of the 863 program for their investment in high tech. Currently the government of China is supporting biotech directly in terms of their investments into universities, research centers and labs to the tune of about \$600 million a year. And so when we look at China, we think it has probably one of the most developed sets of scientific communities that we see outside the United States, and is really quite strong in terms of agricultural biotech and gene therapy. . To give you some perspective of their achievements over the last six years, they were one of the six countries involved in the Human Genome Project, and continue to decode genomes even today that are available to the research community around the world. And, in fact, just recently the Chinese introduced a complete genome for rice, which was a very important development..

They are also one of the first to market a commercially available gene therapy drug called Gendicine, which supports and deals with a particular type of cancer. So they are really on the cutting edge of gene therapy as we see it. And importantly in the area of agricultural biotech with 20 percent of the world's population and only 7 percent of arable land, they are heavily investing in agricultural biotechnology research and rank fourth today in terms of crops under cultivation using genetically modified seeds.

So it's a very strong industry. It's growing incredibly rapidly. And just to give you a feel for where it's going next, the government recently just announced \$250 million on an annual basis to support nanotechnology research. And perhaps we could get into it, but the intersection between what we do in terms of biotechnology tools and nanotechnology are very, very close. So we see ourselves as ultimately becoming a nanotechnology company, as well. And so what I can say a few words about is, is there a development, will there be a development of a commercial biotech industry in China?

On the commercial side of the biotech industry, we see things as being very early stage, nascent if you will; quite frankly, it is still not a viable as an industry as we know it...just yet. We see countless commercial companies trying to sell to us technologies because they are unable to get the money they need to stay viable. And as

my previous colleagues suggested, it's really due to a number of different issues, one of them being the fact that the domestic market for biotech products is still very young. However, I would just tell you I spent most of my career at General Electric, and in a matter of five years' time we were able to build a billion-dollar business around diagnostic imaging and other medical products. So there is a very fast-growing affluent health-care population coming in China that will want the type of very expensive drugs that come out of biotech research.

So people see it. It's just a question of when these drugs will be available and when the money will be there to really support that industry; but that day is coming, and I would tell you it's coming fairly quickly.

So beyond just the need for the development of a therapeutic market that could support these drugs, as the other participants already talked to you about, there is still a lack of commercial sophistication in managing biotech companies; we have that here in the United States as well! And then also, just protecting intellectual property is still very much an issue, as we talked about before. So when we look at China, just to give you where we're going next in terms of Invitrogen as a company, as I said before, we do millions of dollars a year exporting into China. And one of our key initiatives for 2004 is to set the groundwork to make that into well over a \$100 million business in the next couple of years.

We see several ways to do that. The first is that the regulations of China are actually helping us. The government is greatly easing the trade restrictions that will allow us to more directly participate in the country in terms of biotech. And so whether it's through acquisitions and acquiring a number of these different companies that do exist in China, or investing in our own production in China, we see it as being a very strong domestic market for internal consumption/demand but also exporting to other countries around the world.

Between the low-cost labor and the high intellectual capabilities of this country and its people, this is a terrific place to place your business.

So we see China as both a good market and a good export location for Invitrogen to continue its expansion.

Thank you very much.

[The statement follows:]

**Prepared Statement of Mr. Greg Lucier
President & CEO, Invitrogen Corporation**

Executive summary

Chinese investment in biotech began almost two decades ago as part of the now legendary "863" program for investment in high tech. This investment (currently ~\$500–600 million/yr) has created a strong R&D infrastructure of research institutes, labs, centers and universities. In addition, China also has a highly technically trained workforce that can conduct high quality R&D at a much lower cost than labs in more developed countries. These investments have established China as a strong player in genome sequencing, ag-biotech and gene-therapy. They should also provide a strong platform for future growth.

Commercial biotech enterprise, however, is still not a viable industry in China. Although China has mastered many of the basic technologies, it is still seen as lacking a "product" mentality needed to get new drugs/products on the market. Most of the existing biotech companies are small, starved for funding and pursue "knock offs" of products developed elsewhere. They are also almost wholly dependent on

government sponsored R&D. Private capital investment (either VC or stock market) in Chinese biotech is very low due to a lack of clarity of regulations, inadequate legal infrastructure to enforce existing laws, insufficient financial infrastructure to guarantee security and retrievability of investment, and lack of public understanding of biotechnology. Foreign investment is also hampered by insufficient protection of intellectual property (IP). Although, as part of entry into the WTO, China has adopted patent laws that are more aligned with the more developed countries, enforceability of these laws could be further strengthened. The development of local biotech is also hampered by the lack of high caliber management—individuals with both management skills and a deep understanding of biotechnology.

China's large, increasingly affluent and health conscious population presents a huge market opportunity for biotechnology oriented companies in developed countries. China's biotech market is estimated to be ~\$3 billion currently and is expected to grow at ~13.5% annually to reach ~\$9 billion in 2010. The main sources of growth are likely to come from areas such as ag-bio, genomic sequencing, biochips, leveraging leads provided by Traditional Chinese Medicine, Bioinformatics, stem cell research, bio-manufacturing and toxicology testing. Growth could be even higher as IP protection strengthens, financial, legal and regulatory infrastructure improves and there is more influx of foreign investment and managerial talent into the Chinese biotech industry. There is currently little evidence of Chinese companies investing in overseas biotech as a means to acquire technology. China, however, may be gaining access to technology and superior managerial talent by successfully attracting and repatriating Chinese scientists that have been trained abroad or are working in overseas biotech companies.

Invitrogen has a long history in China and remains committed to a continued and strong presence there. Invitrogen first entered the Chinese market in 1979 and continuously distributed its products through local distributors since that time. Given the recent easing of direct trading regulations, Invitrogen is presently considering several options to create a Chinese subsidiary. It expects to more than quadruple its current sales in China over the next five years. Beyond supporting cutting edge research in both medical and ag-biotech, Invitrogen plans to explore opportunities to source raw materials from and to conduct activities such as manufacturing and media development in China.

1) Assessment of the current technological capabilities of the biotechnology sector in China China has had a long history of investment in biotechnology. China's biotech program was officially initiated in 1986 by Deng Xiaoping, with a declaration that biotechnology was one of the seven technologies critical for economic growth. Biotechnology was funded as part of the now legendary 863 program (so named since it was begun in March of 1986) and has had increasing government funding outlays in each of the successive 5-year plans. It is estimated that the Chinese government spends upwards of \$600 million per year on biotech R&D through its various institutes and academic centers. The total biotech market in China inclusive of all sectors is estimated to be \$2.80 billion in 2001 and is expected to grow to ~\$8.78 billion by 2010 (CAGR of 13.5%).

Initially, China concentrated its efforts on agricultural biotechnology, as a means to self sufficiency in food. The challenge is particularly large for China, since it has 20% of the world's population with only 7% of the world's arable land. In 1988, China became the first country to commercialize a bio-engineered tobacco plant resistant to a plant virus. Since then additional research has yielded virus-resistant tomatoes, sweet peppers, peanuts, cotton, papayas. Today, China ranks fourth in the world in total area under genetically modified organism (GMO) cultivation after the US, Argentina and Canada and has developed many transgenic crops. As many as 60 plants are reported to be under research across more than 90 research institutes around the country. Research is also being conducted on more than 30 varieties of GM fish and animals. Animals under research include hogs, cattle, sheep, and domestic rabbits. Scientists have started research using GM animals to produce medical protein. GM microorganism for use in the production of feed additives, vaccines, and pesticides were developed as early as 1999. In addition, China has proven its capabilities in cloning animals. While in the past, cloning has focused on cattle, China is now attempting the cloning of the Giant Panda.

China has had a lot of success in the medical biotechnology field as well. China was one of the six countries involved in the Human Genome project, and successfully sequenced 1% of the human genome. Recently, Chinese scientists published the draft sequence of a rice genome—a task achieved in a remarkably short amount of time, beating an international consortium whose efforts had commenced considerably earlier than China's. This feat underscored the country's ability to reach the highest level of science while facing the array of economic and political challenges often facing developing countries. Chinese scientists have also completed genome se-

quencing of a number of microbes such as *Leptospira icterohaemorrhagiae*, *Staphylococcus epidermidis*, *Shigella flexneri*, thermophilic bacteria, which have played an important role in improving the understanding of disease-triggering mechanisms and development of medical vaccines. About 20 bio-pharmaceutical products have been commercialized so far, including recombinant medicines and vaccines. Thirty more are in clinical trials. The major products of the industry are immunodiagnostics, research reagents for biotechnology laboratories, animal vaccines, human vaccines, Colony Stimulating Factors (CSF), erythropoietin (EPO), monoclonal antibodies, medical material supplies, and feed additives. In late 2003, SiBiono GeneTech received approval to commercially market Gendicine, a gene-therapy based treatment for nasopharyngeal cancer. New Scientist reports this to be the first approved gene-therapy treatment in the world. The treatment delivers a healthy copy of the anti-tumor p53 gene through a simple adenovirus construct that does not integrate into the genome of cells. The cost of a single dose of therapy is expected to be only \$360.

The successes already achieved by China in the area of biotechnology are a result of three major sources of strength.

1) *Availability of research talent:* China has a large pool of more than 50,000 talented research scientists in biotech industry. Unlike countries such as Malaysia and Singapore, China has a history of scientific research, and hence, has built its talent base over a 20-year period. Through its strong educational infrastructure China is expected to grow this pool by about 4500 scientists each year. In addition, China is also providing strong incentives to attract Chinese researchers that have been trained abroad. China now offers all returning doctoral degree holders at least associate professorships, and other material benefits. As a result, China's talent pool is quickly achieving world-class status. Not only is this research pool highly qualified, it is estimated to cost less than a fifth to a tenth that of comparable US talent.

2) *Strong government support:* The Chinese Government actively supports the biotechnology industry as part of its High Technology Program and has reportedly increased its investment in biotech to ~\$500–600 million. Biotechnology features prominently in its agenda of developing knowledge industries. In fact, government funding supports a majority, if not all, of biotech R&D in China.

3) *Research infrastructure:* China has several research institutes, research centers, universities and laboratories that provide the necessary infrastructure for biotechnology research. The Ministry of Science and Technology (MOST) directly funds most of these and also sets overall strategy for all government-funded biotechnology research. The China National Center for Biotechnology Development is a purely administrative body and is mostly involved in activities to promote biotechnology and the allocation of government funds. The Chinese government has also set up technology parks, the largest being in Shanghai and Beijing, to promote commercial biotechnology development. The key institutions/organizations forming the R&D infrastructure include:

- *Chinese Academy of Science (CAS)*—based in Beijing—China's highest academic institution and comprehensive research center in natural sciences. CAS's Lifesciences and Biotechnology Division controls 24 research institutes, 13 research centers and 26 key State laboratories across the country. It employs more than 6,000 research scientists and has a biotech-specific budget of \$90 million (15% of CAS total budget)
- *Chinese Academy of Agricultural Sciences*—based in Beijing it is involved in basic research and spearheaded effort to genetically engineer cotton resistant to the bollworm in early 1990's (bollworm infestation responsible for \$630 million crop loss in 1992–3 alone)
- *Beijing Genomics Institute*—Has been heavily involved in sequencing of the rice genome and boasts one of the largest gene-decoding operations with 500 staff, 100 sequencers, 4 supercomputers. It is currently working on genome for dates and cassava
- *Tsinghua University*—Beijing—houses major biochip lab
 - A professor at the university developed a miniaturized “lab on a chip” (biochip) system for use in drug research and disease diagnosis which then became seed for U.S. start up biotech co *Aviva Biosciences* in San Diego with venture capital came from Taiwanese sources
 - The same professor, along with researchers from several other Chinese institutes, has started a Beijing-based company called Capital Biochip which focuses on biochips and improving the manufacturing process of the chips. It is also working on DNA library, databases and bioinformatics. Capital Biochip received a total of \$47 million in venture capital, some of which was funded by the Chinese

- *Beijing University*
- *Shanghai Institutes of Biological Sciences*—composed of 8 CAS institutes and two research centers in the Shanghai area
- *Chinese National Human Genome Center at Shanghai*—established in 1998, the center sponsors research into a variety of areas related to the human genome (specific examples include cloning and gene expression)
- Shanghai municipal government is building a pharmaceutical/biotechnology complex in Pudong
- China's largest international biotechnology park is being built in Hangzhou (near Shanghai)
- *Hangzhou University of Science & Technology*
- *China National Rice Research Institute*, Huangzhou—spearheaded China's biggest genetic effort focusing on rice—engineering higher yielding rice plants which are more resistant to drought and insects
- *South China University of Technology*
- *University of Science and Technology of China*

Despite the R&D successes, however, biotechnology is still not a viable industry in China. Although, China has ~\$150 biotech companies (40–50 publicly traded and the rest privately funded or government funded), most of these are very small and starved for resources. Most do not engage in cutting edge R&D and in addition, most of the products are knock-offs of US products due to historically weak patent protection in China. Due to intense competition in production of knock-off products, revenues and margins tend to be very low. Venture capital activity, which provides the majority of early stage biotech funding in the US, is very low in China. Most of VC funding in China comes from government or university VC, and is often linked to spin-offs of technology developed at universities. Foreign VC investment in China tends to be low due to a perception of inadequate exit options for any investment.

There are around 20 biotech-derived drugs in the market that are mostly Chinese adaptations of western products. In addition, since Chinese companies often lack the necessary quality standards, sales are limited to the Chinese market. Profitability in the industry is razor thin owing to a high level of competition and government price controls.

There are a few key factors that contribute to China's weak biotech industry:

- *Weak IP protection*: Prior to joining the WTO in 2002, China did not recognize product patents. This made it a very unattractive environment for an IP-heavy industry such as biotech. China's move into the WTO now compels it to recognize international patent laws (including product patents) but enforcement of regulations is still seen as an issue
- *Lack of private funding*: China's biotech is almost entirely funded by the government. Accurate market information is often hard to find and regulatory hurdles have kept foreign investments low. Insufficient exit strategies keep VCs away from the Chinese biotech market. In addition, the Chinese stock market allows only limited opportunities for the VCs to sell their shares.
- *Inadequate management skills*: Success in the biotech industry requires a combination of, management acumen and scientific understanding. The Chinese biotechnology industry has not yet received its fair share of management talent and is generally viewed as not having a "product mentality". Management education is only recently catching up in China and managers with international exposure who understand the intricacies of the biotech business are hard to find.
- Price controls in the healthcare market and poor distribution infrastructure may also be contributing to weakness in the biotechnology industry.

2) Prediction on how the sector will develop in the future.

China is widely expected to become the one of the largest markets in the world and the biotech market is expected to grow strongly as well. Its potential can be gauged through a few interesting anecdotes:

- Sales of genetically engineered drugs and vaccines have grown at an annual rate of ~80% between 1996 and 2000.
- China's population of 1.3 billion currently consumes only \$7 of health care products per capita vs. \$220 for U.S. (per Ernst & Young). Spending on healthcare will increase as Chinese per capita income continues to improve.
- China spends only 4.5% of its GDP on healthcare as compared to 12.9% for the US, 6.9% for Brazil, and 5.1% for India.
- Although China is already the fourth largest producer of GM crops, it currently accounts for only about 1% of the global acreage planted with bioengineered

crops (per International Service for the Acquisition of Agri-biotech Applications—a Philippines non-profit) vs. 68% for the U.S. share.

- To be self sufficient in food, China has to feed 20% of the world's population with only 7% of the world's arable land.

Frost and Sullivan expects the Chinese biotechnology market to grow at about 13.5% annually, from \$2.8 billion in 2001 to \$8.8 billion in 2010. Substantial amounts of this growth will come as more MNC's conduct more R&D and production activities in China, to take advantage of the talented yet cheap labor pool. Growth will also be helped by the improving IP situation and continued government openness to foreign investment. This should also lead to increasing collaborations with international research centers and global pharma and biotech companies. China could play a big role in several potential areas, including:

- Ag-Bio is expected to be a continued focus of government funding as it looks to find crops that have higher yield, greater nutritional value, increased disease resistance, and can grow in "unfavorable" climates/soil conditions.
- *Gene sequencing and Biochips:* China will likely continue its prowess in gene sequencing and capitalize on the biochips market. These chips have helped to cut diagnosis time for many illnesses greatly and proved invaluable in gene expression studies. Diagnostics and pharmacogenomics will become increasingly important as the Chinese population becomes more health conscious and has more disposable income to spend on healthcare. The need to quickly identify control infectious diseases (e.g., SARS) will also promote greater investment in this area. Biochips are not restricted to medical biotechnology, but find many applications in fields such as biochemistry and environmental protection as well. Since 1997 several national engineering research centers with strong professional expertise in research and development of biochips and related products have been established to commercialize biochip development. They include: Beijing National BioChip Research and Engineering Center (BNBREC), Shanghai Biochip Co.Ltd., (SBC) & Shanghai Engineering Center for Biochips, and The National Engineering Research Center of Miniaturized Detection Systems. In addition, there are also several private companies that are in this space including: Capital Biochip, Shanghai Biostar Genechip Inc, Shenzhen Yishengtang Biological Product Co., Shaanxi Chaoqun Science & Technology Co., Shaanxi Chaoqun Science & Technology Co., and Shanghai Huaguan Biochip Co., Ltd. The State Drug Administration (SDA) in China has approved some of these companies' biochips for medical diagnostic use for production and clinic use.
- *Leveraging traditional Chinese medicine (TCM):* Several companies and research institutions are conducting research to identify the active chemical entities of the vast number of TCM remedies. Since these formulations have been proven successful over thousands of years, the effectiveness and safety of the active ingredients of these drugs should be easier to prove.
- *Bioinformatics:* China has established several leading bioinformatics institutes (e.g., Beijing Genomics Institute—Genomics and Bioinformatics Center). These institutes are focused on general and specialized database construction and services, in-silico cloning, and customized development of data analysis tools for post-genomics research. Work is ongoing for an integrated data warehouse system of proteomics research. These institutes have substantial infrastructure, including Chinese-made supercomputers. Bioinformatics prowess was instrumental in sequencing the rice genome. Bioinformatics in China is poised for significant growth in the future as it has the necessary ingredients for success in this area namely, people with good training in biological sciences and computer science.
- Treatment for and vaccines against diseases that are prevalent in China, e.g., head and neck cancers, hepatitis B, liver cancer, SARS, etc.
- *Stem cell research:* While the United States has severely limited government funding for stem cell research because of ethical concerns, China, along with several other countries, is likely to focus on fully reaping the benefits of R&D in this emerging field. In fact, in March 2002, the *Wall St. Journal* reported that at least four Chinese teams are actively cloning human embryos as sources of stem cells.
- *Gene therapy:* China will continue to build on its initial success with Gendicine in other cancers and genetic disorders.
- *Toxicity research and animal testing*—a large portion of preclinical toxicology testing involves routine testing in lab animals. This work is resource intensive but requires technical expertise. With its highly trained but relatively cheap workforce, China could become a major hub in providing these services to biotech/pharma companies globally.

- Manufacturing—China already has significant expertise in the fermentation-based drug and product manufacture. It is one of the world's largest producers of Vitamin C and A and also a major producer of penicillin and other antibiotics. China could easily extend this expertise to other biotech-based microbial and mammalian-cell culture.

Government incentives and funding will continue to support and nurture the emerging biotechnology industry. China is in the process of making its biotechnology industry more broadly market friendly, though protectionism of domestic companies still exists. Starting in 2003, China has eased some of the geographic and capital restrictions on foreign companies to operate retail and wholesale pharmaceutical (companies still need local R&D/manufacturing investment to be able to participate directly in local currency sales without going through a local dealer). In addition, government support for biotech is changing from the current fund-oriented support for biotech research and associated industrialization to policy-oriented encouragement. The incentives planned include:

- No ownership restrictions to be imposed on the enterprises engaged in biotech research and industrialization.
- Biotech industries to be favored during IPO applications.
- The venture capital invested in biotech industries to enjoy income tax exemption.
- The biotech products of independent intellectual property rights to also enjoy tax holidays.

The government is also increasing its support in several existing programs as well as providing strong encouragement for universities to start businesses.

- In 2001, government announced that it plans to increase government funding of ag-biotech research by 2005 to \$500 million annually (a 4–5X increase).
- For 2001–2005, \$240 million will be invested in nanotechnology R&D—funding to be provided by *Ministry of Science & Technology, National Committee for Development & Planning, the Chinese Academy of Sciences, the National Natural Science Foundation of China, and the Ministry of Education*.
- Central government support to biotech as part of the 863 program is expected to more than double from the current \$300 million annually to more than \$600 million by 2005.

3) Assessment on what role foreign companies, investors, and scientists and engineers play in the sector.

The unmet needs and immense growth opportunities of the Chinese healthcare market present a prime opportunity for foreign biotechnology/pharmaceutical companies and investors to tap into. Their ability to play in this market has been considerably eased by China's admittance to the WTO. However, foreign companies, investors and governments can play a role by ensuring that they can help bring the best treatment options to the Chinese market, make a fair profit and preserve their intellectual property in doing so. By increasing the ability of the Chinese to meet their healthcare needs and their ability to participate in the global market through products developed in China, these external agents could provide the greatest incentive for China to become a full participant in the global biotechnology industry.

As discussed above, one of the key issues perceived to be holding up the growth of the Chinese biotechnology industry is the lack of technologically savvy management. Foreign companies and investors can play a critical role in bringing in talent that has been trained in more developed biotechnology environments. It will also be instrumental in training local talent in management best practices. Foreign investment could have spin-off benefits in forcing a more thorough evaluation of company technologies and economic prospects, a broadening of potential markets for products, and most likely encourage more investment in biotech in local capital markets.

Participation of foreign companies is also likely to improve the level of collaboration between Chinese biotech companies and those in more developed markets. This will have the effect of speeding products to market as well as improving their potential value once they are there.

As has happened with semiconductors and other high tech markets, a greater foreign involvement in the Chinese market will also increase the level of services outsourced to Chinese industry—manufacturing, lab animal toxicology testing, etc.

4) What domestic and international factors promote and constrain the development of biotech in China?

Key factors that promote the development of biotech in China (most have been discussed above).

- Availability of research talent at globally competitive rates.
- Government support, investment and incentives.
- Strong R&D infrastructure.
- Liberal approach to potentially thorny areas such as GMOs and stem cells.
- A large population (1.3 billion) that is becoming more health conscious (i.e., increasing its awareness of chronic illnesses and lifestyle drugs in addition to infectious diseases) and has more disposable income to spend on medicine.

Key factors constraining the development of biotech.

- Lack of high caliber management talent that is also biotech savvy.
- Lack of private investment in biotech.
- Insufficient protection for IP.
- Insufficient clarity of financial environment, legal infrastructure for contracts etc.
- Weak regulatory, financial and legal infrastructure.
- The “Guangxi” effect—who you know is often more important than the letter of the law.
- Governmental price controls on healthcare products.
- Relatively low purchasing power of the population.

5) In particular, are any of these constraints created by inadequate intellectual property protection and market access limitations.

China has recently taken several steps to revamp its legislative and regulatory environment to protect intellectual property. As part of its joining the WTO, it has made several specific reform commitments and is also a contracting party in the Patent Cooperation Treaty. Its patent statutes align well with international norms and its Intellectual property office is perceived to perform much better than its counterparts in other developing countries such as India and Brazil.

Despite these advances, however, the US and other developed countries have a major role to play in encouraging China to adequately enforce intellectual property rights. The Biotechnology Industry Organization (BIO) has identified three major areas for improvement:

1. China does not consider transgenic plants and animals eligible for protection. This denies adequate protection for the full range of assets of many biotech companies.
2. The Chinese legal infrastructure is inadequate in supporting investigations of IP infringement activities and for enforcing judgments based on these infringements. BIO thus considers the effective level of IP protection for biotechnology to be inadequate.
3. China's laws also do not protect “essentially derived” varieties of plants, which constitute the vast majority of recombinant plant varieties (derived from registered plant varieties).

China will have to further address these issues before foreign investors and companies become more comfortable with investing in that market.

China is in the process of making its biotechnology industry more broadly market friendly, though protectionism of domestic companies still exists. Starting 2003, China will allow foreign companies to operate retail and wholesale pharmaceutical businesses with no geographical or capital restrictions. In addition, government support for biotech is changing from the current fund-oriented support for biotech research and associated industrialization to policy-oriented encouragement. The incentives planned include:

- No ownership restrictions to be imposed on the enterprises engaged in biotech research and industrialization.
- Biotech industries to be favored during IPO applications.
- The venture capital invested in biotech industries to enjoy income tax exemption.
- The biotech products of independent intellectual property rights to also enjoy tax holidays.

However most foreign participants still face difficulties while going about doing business if they do not have the “right connections” or “Guangxi”. The regulatory framework and enforcement continue to be relatively weak. For example, contract laws are often not enforced uniformly thus bringing mistrust into the business deals and undermining collaborations and partnerships.

In addition, Chinese stock exchanges are perceived to be set up primarily to deal in shares of state-owned enterprises being privatized—no capital market exit strategy to motivate growth of venture capital. Plans are underway by government to create a stock market modeled after NASDAQ but status is uncertain.

6) Are Chinese firms and other organizations are investing overseas as a way of transferring technologies to China.

There is little evidence of direct Chinese investment overseas in biotech companies. Chinese biotech/pharmaceutical companies tend to be very small (revenues of even the largest ones are under \$1 billion). EBITDA margins and free cash flows also tend to be low as well. Hence, companies have little "currency" to make foreign acquisitions. Most of the large conglomerates in China are government-owned and do not yet have an M&A mindset. The fact that the Chinese currency is not yet freely traded also hampers the ability of Chinese firms to make foreign acquisitions. China, however, is actively recruiting expatriate scientists back to China by offering associate professorships and other incentives. Anecdotal reports indicate that it is having a lot of success in doing so.

Also, there is increasing collaboration between Chinese scientists and their counterparts in more developed countries. Some examples cited by NES include:

- *Beijing Genomics Institute*—collaborating with *Syngenta* (created by the merger of AstraZeneca's and Novartis' agrifood businesses) to sequence the genomes of a long-grain rice and a short-grain japonica rice variety. In April 2002, it published drafts of the genomes with the full sequencing expected in one or two years. *UCDavis* is using results to pin down genes in rice genome specifically targeted at resisting fungus.
- *Shanghai Institute of Entomology*—collaborating with *Entomed* (Strasbourg, France biotech company) in search for novel insect-based drugs.
- Chinese government seed company entered into a joint enterprise with *Monsanto* in 1996 to produce and market transgenic crops. The collaboration increased yields by 30% more than local varieties.
- *Beijing University*—together with *Yale University* (US) formed the *Peking-Yale Joint Center for Plant Molecular Genetics and Agro-Biotechnology*. The multidisciplinary research program in plant biology had a specific emphasis on crop improvement.
- *Chinese Academy of Agricultural Sciences* collaborating with *Hong Kong Institute of Biotechnology* to develop new varieties of Chinese vegetables and fruits.

The Shanghai "Medical Valley" already has several top 20 global pharmaceutical companies with a local presence. There is also evidence of increasing investment by foreign pharma/biotech firms in China. For example, Roche recently announced that it will establish an R&D centre at Zhangjiang Hi-Tech Park in Shanghai, China. The centre will support the Roche Group's worldwide R&D activities and its strategic business development efforts in the Chinese market. It is scheduled to be fully operational by the end of 2004, the Shanghai facility will initially be staffed by 40 chemists.

In closing, the large, increasingly health conscious and increasingly affluent Chinese population presents a significant opportunity for biotechnology and pharmaceutical companies that are looking for new avenues for growth. Governments of countries, in which these biotechnology and pharmaceutical companies are based, also stand to gain through increased tax revenues from companies' earnings in the Chinese market. In addition, China also provides a highly talented labor pool of dedicated scientists who could be leveraged to provide the burst of innovation and productivity that biotech and pharmaceutical companies in more developed countries are looking for.

Co-Chair ELLSWORTH. Thank you, Mr. Lucier.

Panel III: Discussion, Questions and Answers

Co-Chair ELLSWORTH. Thank you all, panelists. I have been asked by several Commissioners to have the floor and ask you questions. Start off with Commissioner Becker.

Commissioner BECKER. Thank you.

First, Dr. Zhong, although I would appreciate it if each one of you would look at this a little closer and give me your opinion.

First, some background information for me. The pool of pharmaceutical companies that you mentioned are determined to build a pharmaceutical industry in China. Are those Chinese companies or are they American or international companies that have relocated to China building these firms?

Dr. ZHONG. Okay. In China, in the pharmaceutical industries there's domestic Chinese companies, as well as the foreign companies, yes. And so, the domestic companies has about, as I said, about 65 percent of the market share while the foreign companies have about 25 percent to 35 percent of the market share. Yes.

Commissioner BECKER. Very good. The other question is equally as simple. Biomedical. I knew that the United States had agreed that pre-clinical testing could be done in China. But now I understand from the testimony here today that clinical testing is also being done?

Dr. DANCE. Clinical testing is being done. In the start-up companies, for instance, the only firm I'm aware of is a smaller biotech company in San Diego that did do its Phase 2 trials in China.

There are issues—you cannot at present do all your final trials in China and get it approved. But you can do trials in China and get the human data accepted. You still have to do a U.S. trial before final approval.

Commissioner BECKER. This is a question for all of you.

Are you satisfied that the data you receive back here in the United States from pre-clinical testing and clinical testing as accurate and as reliable as if you had run the test here in the United States?

Dr. DANCE. If the company—

Commissioner BECKER. Are you comfortable with this?

Dr. DANCE. If the company running the trials correctly monitors what's going on, all the Tier 2—so-called Tier 2 countries, whether it's in Peru or it's in India, for instance, is way ahead of China in trying to get trials done. Yes. You can get very reliable data, but you have to very closely monitor it with your own people.

Commissioner BECKER. I raise this because the standards we have here in the United States and the procedures that we follow for clinical testing and pre-clinical testing reminds me of the problem we ran into back in the '50s and the horrible experience we had with thalidomide. Coming out of that established very rigid standards in the United States on biomedical. I think we need to be absolutely sure that the Chinese are meeting those same rigid standards and that we can take that to the bank so we don't suffer some kind of a catastrophe.

Dr. DANCE. Again, if it's a U.S. company running trials in China, you can be assured that all the protocols and so forth are forced into the system. And they're known worldwide now. And they have their internal review boards. They have all the structures.

If it's just a Chinese company running the trials themselves, then they have data, and there's a lot of that so-called anecdotal data and so forth. It's interesting, but it's not accepted.

Commissioner BECKER. Well, it seems like to me that through globalization in other countries, whether it be Mexico or whether it be China, mistakes happen.

We have the SARS epidemic, and the fact that this was not reported and it took World Health Organization to push this before we could get the Chinese government to own up to the fact of the seriousness of it. And we have the bird flu. And from Mexico we had the—I want to say herpes 3, but I don't know what it was ex-

actly now, that came in through onions and killed people in Pennsylvania—

Dr. ZHONG. Hepatitis.

Commissioner BECKER. —and hospitalized much more of them.

I'm just saying our standards have come about through trial and practice. And for us to turn that very important pre-clinical and clinical testing over to another country just because they do it much cheaper—

Mr. LUCIER. I think, Commissioner, what you're going to see is something a little different.

We just purchased the largest preclinical biological testing company, and we're now the largest pre-clinical company in the world. I don't know a lot about it yet, but I will tell you what will probably happen is that companies like mine will move their operations into China following the same U.S. standards that you are advocating, but do it on Chinese soil because it is substantially less expensive.

Mr. PANETTA. Commissioner, I would add to that, that because of the fact that the biotechnology industry doesn't have still the depth of experience in moving products through the FDA approval process, the tendency in biotechnology is still to be cautious about ensuring that the data that are submitted are of the highest standards, the highest integrity and that we can continue to build a reputation with the FDA.

And one of our greatest challenges in moving products into commercialization is the fact that, for the most part, biotechnology doesn't have the experience with the regulatory process here in the United States.

And when I say experience, I'm talking also about the personnel within biotechnology companies who haven't developed that lack of—that depth of experience yet. That there's a tendency still on the part of the industry to ensure that we do everything possible to build that reputation using the high standards that have been set by the FDA for product approval.

Co-Chair ELLSWORTH. Thank you, Commissioner Becker.

Thank you, Panel.

I want to remind my colleagues among the Commissioners and also the panel that we are behind schedule, and we're trying to not cut off discussion and dialogue, but we're trying to catch up if we can.

Commissioner Wortzel.

Commissioner WORTZEL. Thank you. This may surprise some of you, but during the time that I worked in China with the American Embassy, we actually spent a good bit of time looking at what seemed to be a fairly well developed biological defensive and offensive warfare infrastructure within the People's Liberation Army. And I don't think we've ever completely resolved our concerns about offense versus defense. Defense is fine. So Question number one is, can you tell me what you're doing in terms of due diligence to ensure that any Chinese partners or either technology or intellectual property that you're bringing in there doesn't end up inside the People's Liberation Army and used for those purposes.

The second thing—it might surprise you—is there's sort of a large authoritarian infrastructure in China. And all human testing was not necessarily informed testing with informed consent.

So how do you know and how does the American public know that there aren't a whole bunch of people that are sort of compelled laboratory rats, which we wouldn't do in the United States?

And the third question I have specifically concerns nanotechnology because that is an area of great interest, I would say, to the U.S. military and the intelligence community because of its potential for different forms of weaponry, including space weaponry that China's working on, and for intelligence surveillance and reconnaissance.

So, first, is any of the nanotechnology that you're working on of dual use in nature? Does it need a commodities control list export license or an arms export control list license to get out? And, second, how do you know who you're working with there?

Dr. ZHONG. Okay. I would like to answer the second question raised by Commissioner Wortzel and which is also connected with Commissioner Becker's questions.

In China the pharmaceutical industry established the GMP, the so-called good manufacturer practice compliance system right now. And a lot of these GMP is—the standard is established by the international pharmaceutical industry. It's an international standard. And lots of the factories of China, the GMP has to be audited by the USFDA. And the same thing also established in China is the good laboratory practice, the so-called GLP. And it's the same thing in the clinical trial. Now, for clinical trial, if—eventually if the FDA will allow China's data to be transferred to the United States, I think FDA will definitely do an audit and issue a license for—you know, to make sure the quality is there. So I think this definitely will help to solve the concerns that a lot of Americans have about the Chinese data and things like that.

Commissioner WORTZEL. Well, we transferred German and Japanese warfare experimental data to the United States too, but it doesn't say anything about the ethics under which the data were gathered.

Dr. ZHONG. Right. I understand your concern. Yes.

Dr. DANCE. Again, trials, and—first of all, biotech, as was mentioned, is not big. The Big Pharma companies, the Lillys and so forth, you know, are much more in the forefront. But when San Diego or other biotech companies are doing trials there, the only way they're going to be of use is if they're effectively run by the company here. And all the structures for reviewing for safety of patients, making sure each patient is talked to and understands what's happening and so forth are part of any trial. Now, that doesn't mean that trials by other companies going on; but U.S. companies doing trials in China are done under all the rules and regulations that would happen here.

Co-Chair ELLSWORTH. Thank you.

Commissioner WORTZEL. Any takers on nanotechnology?

Mr. LUCIER. The nanotechnology industry is obviously very nascent. We've developed a number of microspheres, nano-particles that can tag molecules and things of that nature. What we see, though, is that the research being done on those types of tools is

primarily centered in the United States. Again, the research we do in the United States is, I would say, one to two times more advanced than what's taking place today in China. So we haven't exported anything of that nature yet.

Co-Chair ELLSWORTH. Thank you, Commissioner.

Thank you, Panel.

Commissioner Mulloy.

Commissioner MULLOY. Thank you. I was looking at Dr. Zhong's testimony. And he tells us that—on his testimony, page 8—the Chinese government appears to be determined to build the country into a major player in the pharmaceutical industry.

And, Mr. Lucier, you tell us that Chinese—on page 3 of your testimony, the Chinese government actively supports the biotechnology industry as part of its high-technology program. And then you further tell us that they're offering—for people who have Ph.D.s that come here to study, they want to bring those folks back to China and that they're offering them associate professorships.

As a result, China's very quickly building a very talented pool of people who are very good in this.

And, Dr. Zhong, you make the same point. And you tell us that they can do this work at one-tenth the price that people in the United States can do it.

So the question I have, is there anything inherently different—you know, the whole consumer electronics industry has moved out of this country.

Now, is there something inherently different in the pharmaceutical industry that makes it not subject to these tendencies to move, or could a government with a clear national strategy that they want this industry to accomplish the same thing in this industry as has been accomplished in some other industries?

And I would really like the panel—and one last thing I noted, Dr. Dance. Is it the Chinese government investing in your fund, or who is investing in this fund?

Dr. DANCE. It's a Chinese individual. Now, the wealthy Chinese individuals all have government connections, but it is not a government investment.

Commissioner MULLOY. Okay. So by investing in your fund, you're at least identifying those technologies at an early stage, which are going to pay big, maybe big dividends. So is there anything inherently different in your industry that can prevent this thing from happening to you that's happened to other major industries in this country in terms of just being outsourced to another country?

Dr. ZHONG. Yes. I think the move on the activities from the United States to China will be somehow limited. And the thing—the major thing is that the U.S., especially the biotech company industry, is looted from universities and the research institutes.

And at the R&D level these companies have very, very tight relationships with the U.S. universities and the research institutes. So I think that most of the research and the development activity will be still remaining in the United States.

Commissioner MULLOY. What do you think, Mr. Lucier?

Mr. LUCIER. Perhaps I would give a little bit more mixed answer to that, which is that the United States has an incredible research

heritage by funding the universities and the National Institutes of Health. And to the extent we continue these efforts, which happened very nicely over the last several years, our position as a pre-eminent biotech country is assured. However, when you look at more recent Federal budgets the investment in government-funded research is now trailing off. This should be of concern for those who are focused on making sure the USA stays strong in biotech.

Now, having said that, there is the countervailing trend that still says as these other countries, like India and China, come up, there is nothing to say that their industry isn't going to grow probably faster on a relative basis than the United States. The key, really, is for the United States to remain in a leadership position. And we have to continue to fund the NIH, and the universities to the extent we have historically; otherwise, you will lose this industry.

Commissioner MULLOY. In other words, you're telling us the government does have some role in helping the United States to maintain its—

Mr. LUCIER. I would say in this industry, the government has a massive role to maintain an edge in biotech.

When I look at our business, it all emanates out of government-funded research, and it all finds its way eventually towards commercial property.

Commissioner MULLOY. Thank you very much. That's very helpful.

Co-Chair ELLSWORTH. Thank you, Commissioner.

Thank you, Panel.

Commissioner Dreyer, please.

Commissioner DREYER. One quick question and then one longer one.

I was fascinated to learn about China's work on genetically modified organisms. And one of the reasons is that China has been objecting to importing U.S. soybeans and so on is because they are genetically modified organisms. Do you see some kind of contradiction, as Mao Zedong might have said, in this? That's the quick question.

The other one is, a couple of years ago I listened to a speech by Annette Lu, the president of Taiwan, talking about how Taiwan's economy could continue to grow and prosper only if Taiwan remained on the cutting edge of technology. Biotechnology was the area she advocated for Taiwan to do this next in. That set me wondering, has it happened? And if so, has it done so in competition with the mainland or in cooperation with the mainland? I believe Mr. Lucier mentioned that there was Taiwanese capital involved, but I'm thinking of joint research projects or something like that. So that's my longer question.

Mr. PANETTA. Maybe I could take the first one because I worked in this field for about 15 years before coming into my current position, Commissioner.

I think in my experience the issue of whether or not a country will accept genetically modified organisms doesn't go so much to the issue of whether they're safe or whether there are processes available to evaluate the safety and the risk of genetically modified organisms because those exist.

Now, we set the standard here in the United States. There are processes in Europe and other parts of the world to adequately evaluate safety and risk.

It comes down to more protectionism than anything else, and that protectionism goes to countries, not just China, wanting to catch up. And they're buying time by taking this kind of approach until they're to a point where they have the same ability.

Because there's no question that this technology is going to project agriculture to a level where we are going to be able to feed the population of the world as it grows and doubles. But that's my take on it.

Commissioner DREYER. Thank you. And do I have any takers for the second part?

Mr. LUCIER. I'm not sure about the Taiwanese investment. I think one of my other colleagues talked about that.

However, the Taiwanese biotech industry is very strong. On a relative basis, though, we see a lot more investment now going into China and research projects in Mainland China than Taiwan. So—

Commissioner DREYER. I'm sorry. Who is doing the investing?

Mr. LUCIER. Both commercial companies in Taiwan and the government. In Mainland China it's primarily the government investing into this industry for research purposes. So to give you relative growth rates that we see in our own business, Taiwan over the last five years was probably growing at a 25 percent annual clip. It has slowed down now. Mainland China is growing at upwards of 25 to 30 percent now, at least in our business. So we see a shifting taking place towards Mainland China.

Commissioner DREYER. Anyone else? Thank you.

Co-Chair ELLSWORTH. Thank you, Commissioner Dreyer.

Thank you, Panel.

Commissioner D'Amato, please.

Vice Chairman D'AMATO. Thank you, Mr. Chairman. Mr. Lucier, do you find in your experience in the China market—I want to get a little idea of what you experience.

In order for you to operate in the Chinese market, is it necessary for you to take on Chinese partners or Chinese investment or Chinese piece of your action by the government or other commercial firms.

Mr. LUCIER. Under the current trade regulations—and I'm not an expert here, but I understand there's really two vehicles, and I'll tell you the one we're pursuing. Today we go to market primarily through distributors. However, this year that will change, and we'll either acquire a company so that we will have full-time presence in China. Or, as I understand it, you can joint venture in through a trading relationship with a local company and then assume full ownership after 2006, I believe.

So, one of those two vehicles for us will be the way that we continue to expand our business beyond just being a distributor of these products that we do today.

Vice Chairman D'AMATO. So you have to either acquire a company—and does that company then become part owner?

Mr. LUCIER. No. It becomes a fully owned subsidiary of Invitrogen then. And it's part of an American corporation.

Vice Chairman D'AMATO. Okay. Now, in terms of enforcement penalties, IPR, how big a problem is the IPR piracy issue that you experience? Do you experience that?

Mr. LUCIER. We really don't experience too much in terms of piracy of our intellectual property. I'm not so sure that our products are worthy of piracy. They're smaller. They're more just enabling technologies to allow you to do bigger things in research. And so we haven't seen a lot of that take place in both India or in China, quite frankly.

Vice Chairman D'AMATO. Maybe that's a better question for Mr. Panetta's companies. What kind of a problem is piracy for your association?

Mr. PANETTA. I think, Commissioner, it comes down to the fact that we don't have that much experience with biotechnology therapeutics and other products being marketed in China yet. And the concern is—I think it's one of apprehension more than anything else. Before entering China with these products, my members want to be darn sure that they're going to receive the protection and the enforcement of their intellectual property because they can lose it in an instant without that protection. So the greater assurances of that protection would encourage greater movement into China.

Vice Chairman D'AMATO. Do you get assurance that they'll be protected from the government?

Mr. PANETTA. We're receiving those assurances. As Dr. Zhong mentioned, things are changing in China, and those assurances are being given.

And that's, I think, creating more interest in opportunity in China. It's a matter of who's going to step into the pool first.

Vice Chairman D'AMATO. Yes. Because across the board, the problem is that there is no enforcement of the IPR laws. They put the laws on the books, and they don't enforce them. But that's not something that you experience yet as a big problem for your industry?

Mr. PANETTA. No.

Vice Chairman D'AMATO. Okay. Thank you.

Co-Chair ELLSWORTH. Thank you, Commissioner D'Amato.

And thank you, Panel.

Well, this panel has come to an end. It's interesting that the next panel is going to take us slidingly and gracefully, I hope, into some of the same issues we've just been discussing: China as a High-Tech Leader: Technological Capabilities: Intellectual Property Protection and Market Access and Chinese Overseas Investment.

And we'll resume with that panel after a very brief, very brief five-minute break. So thank you very much.

(Recess taken from 2:26 p.m. to 2:33 p.m.)

PANEL IV: CHINA AS A HIGH-TECH LEADER: TECHNOLOGICAL CAPABILITIES: INTELLECTUAL PROPERTY PROTECTION AND MARKET ACCESS AND CHINESE OVERSEAS INVESTMENT

Co-Chair ELLSWORTH. Thank you very much, ladies and gentlemen. Panel IV, seated before us, has as its subject China as a High-Tech Leader: Technological Capabilities: Intellectual Property Protection and Market Access and Chinese Overseas Investment.

And to take us through that very rich topic we have William Bold, Vice President, Government Affairs, QUALCOMM; Jason Dedrick, Center for Research on Information Technology and Organization, University of California, Irvine; Dr. Francine Berman, Director of the Supercomputer Center, University of California, San Diego; and Dr. Michael May, Professor Emeritus, Center for International Security and Arms Control, Stanford University. Dr. May, in an earlier incarnation, was director of the Lawrence Livermore National Laboratory.

I'll start with Mr. Bold, and we'll go down the panel in that direction, if you please, with five minutes to begin, and then for the Q and A, seven or eight minutes for each Q and A—or is it the reverse? The reverse. Seven or eight minutes for your opening, and then five minutes for the Q and A.

Please, Mr. Bold.

**STATEMENT OF WILLIAM BOLD, VICE PRESIDENT
GOVERNMENT AFFAIRS, QUALCOMM, INC. (TELECOMMUNICATIONS)**

Mr. BOLD. Thank you, Mr. Chairman, members of the Commission.

My name is William Bold. I'm vice president of Government Affairs for QUALCOMM Incorporated, the largest private company in San Diego. In this capacity I manage QUALCOMM's relationships with governments, not only here in the United States, but around the world and have been closely involved with our dealings with the Chinese government.

QUALCOMM is a leader in developing and delivering innovative digital wireless communications products and services based on the company's Code Division Multiple Access technology known colloquially as CDMA. CDMA technology has become the leading choice for what is called third-generation wireless communications, which combine both voice communications, traditional and cellular systems, with high-speed wireless Internet access of up to 2.4 megabits of data per second. So very fast. Today there are more than 60 million subscribers to this 3G CDMA technology in more than 30 countries, including China and the United States.

We derive most of our revenues from two activities: The design and sale of ASIX, or semiconductors, which are used in mobile phones and network equipment, and the licensing of our considerable portfolio of intellectual property. QUALCOMM licenses this portfolio to vendors, who then in turn develop phones, network equipment. So we're not involved in the manufacture of products, but, rather, we enable companies to manufacture their own products for sale.

As of September of last year we have been issued more than 1,000 patents for our technologies, primarily focused on CDMA. And we've consummated royalty-bearing licenses with some 115 companies, including basically every major equipment vendor in the wireless communications industry.

China has been a very important market for QUALCOMM. Since 2001 the growth of mobile phone subscribers in China has increased by, on average, 4 million subscribers on a monthly basis. The total number of mobile phone subscribers is now over 200 million, and the market is expected to continue to grow at a fairly

rapid clip. Our experience, though, in introducing CDMA technology to China was a long one. We worked for more than a decade to educate Chinese officials and Chinese companies on the value and proposition of CDMA as a platform for supporting, again, not only voice, but data services. After some fairly intense business and political diplomacy, the Chinese government did agree in 1999 to license CHINA UNICOM, which at that time was the second-largest wireless operator in China, to operate a nationwide network based on CDMA technology.

The network became fully operational in 2002 and today we're happy to say boasts more than 20 million subscribers.

As part of the process of introducing our technology to China, QUALCOMM negotiated licensing agreements with prospective Chinese equipment vendors. And these vendors, the Chinese government and QUALCOMM itself regarded the extension of these licenses as an opportunity to strengthen what has become a growing competency in China in the design and manufacture of wireless equipment at very sophisticated levels. This is something we've done in previous markets, like Korea and Japan, where we've introduced CDMA in companies such as Samsung, Kyocera, Hyundai, today make some of the most innovative phones available not only in those markets, but here in the United States. In most global markets we negotiate our licenses on a bilateral basis, business to business.

In China we took the rather unorthodox step of negotiating what was called a framework agreement; not with the government and not with the vendors themselves, but, rather, with the network operator, CHINA UNICOM. That framework agreement then gave us the basis to go to the individual equipment vendors and negotiate royalty-bearing licenses. And this process, while unorthodox, certainly resulted in a satisfactory result for QUALCOMM and I think for American industry generally.

Under the framework agreement, QUALCOMM granted these royalty-bearing licenses to Chinese vendors in exchange for a commitment that they would purchase QUALCOMM semiconductors so long as those semiconductors were competitive in terms of both price and function.

Subsequent to the negotiation of that agreement, the Chinese vendors have, indeed, stepped up their efforts and developed some very innovative phones and network equipment that are being sold not only in their domestic markets, but also significantly, I think, in export markets, particularly in the developing world. One issue that has come to the forefront in our sector is Chinese efforts to develop technical standards. And this is something that I think has probably been touched on in previous panels. But it's probably been most prominent in our sector where Chinese academia and industry have brought forth a standard, which is known by the acronym TD-SCDMA. It's actually a variant of the CDMA technology, which QUALCOMM originally brought to the market, but it's been tweaked a little bit by some Chinese vendors and by Siemens, the large German telecommunications manufacturer. It's based on our technology, and we are indeed supporting it.

As Chinese vendors extend their participation in both domestic and foreign markets, we think that they will naturally seek to de-

velop IPRs and patent those IPRs and hopefully export them into third markets. We view this development, frankly, as very positive. As a company whose lifeblood is the licensing of IPR, we believe that a Chinese IPR industry will hopefully provide new perspectives to the Chinese government and the companies themselves on the importance of adherence to the WTO agreements that are relative—relevant, rather, on TRIPS and other areas. Looking forward, we see two major issues facing us in China. The first is the potential of wireless communications to transform Chinese business and Chinese society.

Wireless communications are cost-effective relative to fixed line, copper or fiberoptic communications.

So we expect that our partners, CHINA UNICOM and future Chinese operators, will be able to offer many Chinese consumers their first Internet access on a wireless device. This is particularly true in western China. With burgeoning population, but very, very poor telecommunications infrastructure, very low tele-density relative to the eastern regions of China.

Our technology, which as I mentioned before, can offer data rates of up to 2.4 megabits per second would be ideal to serve this market for at least a couple of reasons. First, the phones and the equipment, the portable devices are very cost-effective relative to desktop computers or even laptop computers. Secondly, the technology that we've developed can be deployed by operators in China without the need for them to go obtain new spectrum.

This is actually similar to what Verizon Wireless is doing here in the United States where they're offering this very fast wireless communications technology without a grant of new spectrum from the Federal Communications Commission.

The same situation is true in China. And in a time with fairly scarce resources, we think that this will set China ahead. The other main issue, though, does involve spectrum allocation. The Chinese government is currently considering the terms of future licenses for both their existing and their new wireless operators.

We have encouraged the ministry of information industry, which governs this process, to license operators on a technology neutral basis, as we encourage governments around the world.

We actually are fairly confident that the Chinese do understand their obligations under the WTO and the advantages of letting the market decide to an extent which services are most attractive.

So in conclusion, we continue to believe that the Chinese wireless market offers unique opportunities to companies such as QUALCOMM. Our experience to date has been different than in other markets, but it certainly has been positive. And while we've yet to consummate a number of licensing agreements with certain Chinese vendors, we do believe that this process should go smoothly in accordance with international and domestic laws.

We believe wireless communications will help transform Chinese society and business, and we look forward to a very productive future in what is one of our most exciting markets. Thank you.

Co-Chair ELLSWORTH. Thank you, Mr. Bold.

Mr. Dedrick, if you will, please.

**STATEMENT OF JASON DEDRICK
CENTER FOR RESEARCH ON INFORMATION TECHNOLOGY
AND ORGANIZATION
UNIVERSITY OF CALIFORNIA, IRVINE (ELECTRONICS
MANUFACTURING)**

Mr. DEDRICK. Yes. Thank you, Mr. Chairman and Commissioners.

I have been doing research on the computer industry in Asia for about the past ten years. And my colleague at UC Irvine, Professor Ken Kraemer and I have written a book and some papers on the industry. And one of the main questions we've asked is, has Asia's incredible success in computers been good for the U.S. or not? Our conclusion when we wrote our book about five years ago is that on balance, it was beneficial to the U.S. computer industry and even to U.S. workers. And this was for three reasons.

One was, by developing production networks in Asia, U.S. companies were able to compete with the Japanese who at one time were predicted by almost everyone as being ready to take over the computer industry from the U.S. Secondly, U.S. companies were able to pass off low-value, low-margin manufacturing to Asia and keep the increasing returns or higher profit and higher margin industries in the U.S.

As more than one Taiwanese company said to us while we were doing research, we're all killing ourselves to make money for Microsoft and Intel.

Commissioner DREYER. I'm sorry. We're all killing ourselves to make money from what?

Mr. DEDRICK. Make money for Microsoft and Intel.

So those are American companies. And, third, I think maybe most importantly, the fact that we had access to cheap hardware or lower cost hardware from Asia meant that, for one thing, the I.T.-driven productivity boom of the late '90s was made possible. And, secondly, while there was a net loss of jobs in hardware production in the U.S.—and I don't mean to minimize that based on the discussion we had this morning. A lot of people at IBM and DEC and places like that lost their jobs, but there were many more jobs created in the U.S. software and I.T. services industry than were lost in hardware. So while there were adjustments and there were losses, on balance we felt that the impact of the growth of Asia was good for the U.S. industry and for the U.S.

Now, since that time the big phenomenon in Asia has been China. China has gone from \$1 billion in computer production to \$45 billion in a decade; is now the second-largest computer producer in the world, having passed Japan, and probably will pass the U.S. before long. It's also become the second-largest PC market in the world. The overall I.T. market is still not one of the largest, but it has passed Japan as the second-largest PC market. Some of the numbers that people brought up this morning I think also helped make that point of how rapid the ascension of China in the computer industry has been. Has this been good for the U.S. or not? This is a question I think we need to revisit. And this leads to a couple of the questions that are the theme of this panel. One is intellectual property. Another is market access.

Besides that, I would add the question of competition, whether U.S. companies are creating their own competitors. I think the

things that made the situation of the '90s with the Taiwanese suppliers work out so well for the U.S. is that the Taiwanese never really tried to compete with the U.S. PC companies. They were happy to be suppliers, and they didn't really have the resources to tap global markets. So one question we might raise is whether this is going to be the case in China or whether Chinese companies will end up being global competitors to the U.S. Second question is whether U.S. companies will be able to compete in this growing Chinese market. If it's now the second-largest PC market and it is by far the fastest growing—it's also a fast-growing market for many other IT products—what kind of success are American companies likely to have there?

And, thirdly, of course, intellectual property protection. This is certainly already a big issue in the software industry. Microsoft has and the business software alliance have complained about the loss of revenue that they have in China due to piracy.

Even the lawsuit that Cisco had against Huawei was a software issue. It wasn't a hardware licensing issue. It was Cisco's Internet operating system.

So that issue, I think, is very important and one that we have to consider. And, finally, a new one that we're looking at is the question of whether what we call knowledge work—software, design, engineering and so on—is going to follow manufacturing to China.

And let me just address each of these very quickly and spend maybe a minute on each one of them.

In terms of market access, can U.S. companies compete in China? There's no real formal trade barriers anymore; however, most people do agree that China still favors local companies in government procurement. More importantly, though, is the distribution channels. Legend Computer now has about 30 percent of the China PC market, and the main reason for that is the distribution network that they've created, franchised resellers and also franchised distributors all over the country. Not just in the rich or coastal cities, but they blanket the whole country. This is something that would be very difficult for any foreign company to try to replicate at this point. It would be very costly. And in China you don't have sort of a Comp USA or a Circuit City or a Best Buy that's all over the country to give you distribution. Meanwhile, Dell has been in China trying to do their direct sales model, which is dominating the U.S. market. So far it's had limited success because of the lack of physical, financial, legal infrastructure, credit cards, things like that.

What I think you may see in the future is a situation like we have in Japan, where foreign companies and U.S. companies are able to fight over 20 or 30 percent of the market, but are not likely to become the dominant players. On the other hand, if you're Intel, a good California company—they all have Intel chips in them, so it's all good for them. So still everybody is making money for them, if not necessarily Microsoft.

Will Chinese companies compete with U.S. companies in global markets? I would say not in the near future. They lack the branding. They lack the marketing, the distribution. A lot of capabilities would be very expensive for them to try to develop in global mar-

kets. A lot of other companies have tried it, including the Japanese, and haven't been very successful in the computer industry. Plus they have a big market to grow in China. It's a lot easier for Legend to grow in China with that market than to try to compete in the U.S. or other markets. On the long run this may be different. Legend has changed its brand name to Lenovo, specifically to be able to go into foreign markets with a brand name that's not a generic name. Huawei is winning business abroad in network equipment, has a billion dollars in international sales. And now Haier, and appliance manufacturer which is pretty well established in the U.S., is moving into some electronics products.

Finally, will knowledge work, such as design, development and engineering, follow manufacturing to China? It's already happening. U.S. companies have outsourced most of their design, for instance, for notebook computers to Taiwanese suppliers. The Taiwanese are gradually starting to move that engineering, at the low end anyway, to China. And people in Taiwan are predicting that within a few years, the majority of that work will be done in China. On the other hand, the work that's currently done in the U.S. of concept, preconcept design, industrial engineering, industrial design—will probably stay here because of the skills, the market access, the knowledge of the U.S. market that is important to that kind of work.

A couple of final points.

As Barry Naughton brought up this morning and other people did, this is not a U.S.-China story. It's a U.S.-Taiwan-China story when you talk about the computer industry. And, also, I think it's important to realize that things are changing very fast. What we were finding four or five years ago is not necessarily the case today. And I think some of the things that seem to be true now may not be true in a few years.

So the situation is flexible and fluid, and what you think you know today may not be true tomorrow.

Co-Chair ELLSWORTH. Thank you so much, Mr. Dedrick.

Dr. Francine Berman, if you will, please.

**STATEMENT OF FRANCINE BERMAN, Ph.D.
DIRECTOR, SUPERCOMPUTER CENTER
UNIVERSITY OF CALIFORNIA, SAN DIEGO**

Dr. BERMAN. Thank you very much. My name is Francine Berman. I'm the director of the San Diego Supercomputer Center. I'm also a professor of computer science at UCSD. I'm very pleased to testify today before the Commission on developments in supercomputing and science. Understanding today's integrated and global approach to technology and science has important implications in U.S. technology policy towards China.

Today I'll focus my remarks in three different areas. First, I'll describe today's global environment for supercomputing and science to give some context. Second, I'll describe current trends in supercomputing in China. Third, I'll discuss key characteristics for leadership in supercomputing and how it affects all of us.

To start with, supercomputing is best defined as the highest performing technology that can be brought to bear on an individual problem. To date, supercomputing technologies have been widely acknowledged as an enabler for new generations of scientific dis-

coveries. Today supercomputing is accomplished by more than just high-performance supercomputers. Modern supercomputing applications utilize high-performance computers, high-speed networks, large-scale data storage, scientific instruments and other resources often coordinated by Grid and other integrated technologies to enable break-through scientific results. For example, consider the Human Genome Project: a combination of special-purpose machines for high-throughput DNA sequencing, large-scale data storage and high-performance computers were used to calculate 500 million trillion base-to-base comparisons to perform arguably the largest biology calculation to date.

Leadership in high-performance supercomputing today is typically ranked, at least with respect to single machines, by ones ranked on the global Top 500 list. Of the world's fastest 15 machines (measured in terms of speed when executing the solution of a dense system of linear equations on a dedicated machine), China's submission is No. 14, preceded by 13 U.S. and Japanese supercomputers, with the top spot occupied by the Japanese Earth Simulator. Probably the largest commonality between the machines at the top of the Top 500 list is the considerable commitment, planning and funding over a substantial period required to develop and support the human, software, and hardware infrastructure required for a leadership position.

Concurrent with the increasing integration and globalization of technology, science today has become a team sport. Many scientific disciplines are coming together, crossing national boundaries in unprecedented ways enabled by globally integrated technologies.

For example, in High Energy Physics, scientists from around the world are coming together in the Compact Muon Solenoid project, or CMS, forming one of the largest scientific collaborations in history. The CMS experiments will allow scientists to recreate the conditions prevalent in the universe just 10 to 12 seconds after the Big Bang. As of mid 2003, 2300 people from 159 institutes in 36 countries spanning Europe, Americas, Asia and Australia were involved in CMS. In short, today's science and technology landscape provide an integrated and global perspective and tremendous potential for advances in discoveries, but not well represented by traditional notions of ownership credit, et cetera. It's within this landscape that I would like to talk about China's evolving science and technology programs.

I'll turn my remarks to China's presence in supercomputing now.

Over the last ten years, China's rate of growth in supercomputing has been rapid. Today China has several supercomputer centers, the largest of which is CNIS, the Computer Network Information Center at the Chinese Academy of Sciences, which currently has a staff of about 170.

In contrast, the National Science Foundation Supercomputer Centers here in San Diego and in Champaign-Urbana and in Pittsburgh, SDSC and NCSA have about 400 staff; and PSC has about 90 staff. To date, China has the domestic capability to build fast supercomputers. Its current most powerful supercomputer is a Chinese-built commodity cluster model and is ranked 14th on the Top 500 list. The U.S. and Japan, as I said before, have the preceding

13 computers. The Chinese have 9 supercomputers on the Top 500 list, with the fastest after No. 14 being No. 82.

The top 500 Chinese supercomputers are built by a variety of companies including Legend from China, IBM, HP and a home-grown computer at Shenzhen University.

China's first appearance on the Top 500 list was in 1995 with an IBM computer at the China Meteorological Administration, ranked 143. It wasn't until 2002 that the Chinese had a computer ranked higher, No. 43 at the Chinese Academy of Mathematics and Systems Science. In addition to high-performance supercomputers, China is also moving into the area of Grid Computing. With the U.S. and others, China is a founding member of the Pacific Rim Applications and Grid Middleware Assembly, or PRAGMA. PRAGMA is a highly successful international Grid project.

China is also developing its own national Grid projects, including the China National Grid Consortium and the China Grid Forum. China also participates in a number of international networking projects, including the GLORIAD project linking the U.S., Russia and China, the Asia-Pacific Advanced Network, the Asia-Pacific Grid, et cetera.

Technology is receiving a big push in China, as it is all over in the world, by access to and availability of information through the Internet. In 2003 China's Internet usage rose 34.5 percent to 79.5 million Web users, exceeding Japan for the first time to claim the most Internet users in Asia. During that same year, sales of computers in China reached 17 million in the first nine months, nearly twice the 9.17 million sold in 2002. The rapid march of technology in China is perhaps the largest factor affecting supercomputing in China. China can build its own commodity cluster supercomputers, and China's increasingly a contributing member of the Grid community. In particular, China's growing supercomputing capabilities are independent of U.S. export policies. In the areas of both supercomputing and science, intellectual property protection and limited market access will not necessarily deter China's progress. The growth of open source software and the scientific traditions of open exchange of information and international collaboration are the principal factors enabling science and technology in China, as they are all over the world.

So what does it take to be a leader in supercomputing?

More than any other factors, the key to leadership in supercomputing today is the ability to make it a national priority and to back it up with resources, commitment and planning. For traditional high-performance supercomputing, the top spots in the Top 500 list demonstrate a multiplicity of architectural models, uses and institutional environments. What's common among them all is the commitment of resources applied to their successful development and deployment.

If you consider the Japanese Earth Simulator, No. 1 in the Top 500 list since June 2002—some called it computnik in the New York Times—the project planning started in 1997 and was funded at a U.S. equivalent of about \$500 million. That \$500 million went for hardware development and deployment, housing and maintenance, human support and development, and scientific research. The project involved serious investment and sophisticated plan-

ning, organizational support, and infrastructure for a sustained period of years.

Today, many countries are working towards global leadership in science and technology and are building large-scale national efforts to achieve that leadership. The European Union has just put tens of millions of dollars into large-scale projects. Japan is following the Earth Simulator with a plan to build a very large 25 teraflops Grid cluster.

Three years ago the UK decided to get into the business of Grid Computing, middleware and now is a leader in that area.

In particular, technology leadership in the supercomputing area rests on the ability to successfully fund, deploy and integrate resources and infrastructure at the largest scale. Both the United States' and China's success will be incumbent on an ability to bring national strengths and serious resources to build leadership.

In today's increasingly virtualized and integrated world, everyone is both a potential resource and a potential competitor. Thank you very much.

[The statement follows:]

**Testimony of Dr. Francine Berman, Ph.D.
Director, San Diego Supercomputer Center
Professor and High Performance Computing Endowed Chair
U.C. San Diego**

Supercomputing and China

Mr. Chairman and Distinguished Commissioners:

I am pleased to testify today before the Commission on developments in supercomputing and science. Understanding today's integrated and global approach to technology and science has important implications to U.S. technology policy towards China.

I will begin by discussing the area of supercomputing and the role it plays in today's science and technology landscape to provide context for these remarks. I will then discuss supercomputing in China. I will complete my testimony with some remarks on leadership in science and technology today.

Supercomputing Today

"Supercomputing" is the highest performing technology that can be brought to bear on an individual problem. Over the last 20 years, supercomputing technologies have been widely acknowledged as an enabler for new generations of scientific discoveries. The increasing capability for large-scale analysis, modeling, simulation, and other key approaches have enabled dramatic progress in a wide spectrum of scientific disciplines and fundamental discoveries in science and engineering.

Today, supercomputing is accomplished by more than high-performance computers. Modern "supercomputing" applications utilize high-performance computers, high-speed networks, large-scale data storage, scientific instruments, and other resources, often in a coordinated way, to achieve breakthrough scientific results. For example, the recent sequencing of the Human Genome combined special-purpose machines for high-throughput DNA sequencing with large-scale data storage and high-performance computers to calculate 500 million trillion base-to-base comparisons. Over 80 trillion bytes of data were produced by the DNA sequencing pipeline and were utilized in a genome analysis calculation. The calculation required over 20,000 CPU (central processor unit) hours, arguably the largest computational biology calculation ever performed at the time.¹

Coordination of resources for the execution of an individual application is the focus of "Grid Computing," a software and services technology which allows the virtualization of distributed resources. The potential of Grid technologies to link distributed resources for computation, data management, and multi-resource supercomputing has resulted in a global effort in the development and deployment of Grid

¹Celera Genomics Completes the First Assembly of the Human Genome, <http://www.celera.com/celera/pr—1056581295>.

software and services over the last decade. Projects such as the U.S. TeraGrid,² the Pacific Rim PRAGMA Grid (of which China is a founding member),³ and the European Union's DEISA (Distributed European Infrastructure for Supercomputing Applications) project⁴ demonstrate the potential of Grid Computing as a unifying global concept.

Most commonly, Grid technologies are used to link stand-alone, high-performance supercomputers and data storage, scientific instruments, visualization facilities, and other resources. A few applications can achieve supercomputer-level performance using collections of less powerful resources alone, for example, SETI@home achieves tens of TeraFlops on millions of laptops and PCs.^{5,6} However, most supercomputing-class applications are not able to tolerate the longer latencies, heterogeneity, and dynamism of very large collections of small-scale resources. Instead, they use the Grid to link a few high-performance resources, coupling the fast interconnects and optimized architectures of today's high-performance supercomputers with remote storage or data-generating scientific instruments across high-speed networks to enable breakthrough results that were not possible a generation ago. Even in the most traditional conceptualization of supercomputing, high-performance supercomputers themselves are aggregations of key technologies from a global spectrum of sources. Today, Chinese supercomputers use imported Itanium chips from Intel and Opteron chips from AMD. U.S. supercomputers are made by multi-national corporations such as IBM, Cray, and Hewlett Packard, and incorporate RAM made in Korea and other semiconductors from Malaysia, Singapore, Taiwan, Japan and elsewhere, as well as components made in the U.S. Over the last few decades, a number of different architectural models for high-performance supercomputers have been developed, reflecting complex trade-offs between differing technologies and various alternatives with respect to the amount of supercomputer "real estate" devoted to processor power, memory and interconnect.

Leadership in high-performance supercomputers today is typically marked by one's rank in the global Top500 list (www.top500.org).^{7,8} Of the world's "fastest" 15 machines (measured in terms of speed when executing the solution of a dense system of linear equations on a dedicated machine), China's submission is number 14, preceded by thirteen U.S. and Japanese supercomputers, with the top spot occupied by Japan's Earth Simulator. The machines at the very top of the Top500 list are generally interconnected aggregations of "smaller" machines, differing in CPU instruction set and high-speed interconnect. Most are programmed using message passing, making them similar for the programmer. Vector supercomputers have higher memory bandwidth than cluster supercomputers, and address a wide class of applications, however vector supercomputers are generally significantly more expensive than cluster supercomputers. Probably the largest commonality between the machines at the top of the Top500 list is the considerable commitment, planning and funding over a substantial period required to develop and support the human, software and hardware infrastructure required for a leadership position.

In brief, although stand-alone high-performance supercomputers remain at the core of modern supercomputing, today's applications use a broad spectrum of high-end resources, integrated by software technologies, and coupled to support new generations of advances and discoveries.

Science without Boundaries

Concurrent with the globalization of technology, science today is conducted as a "team sport." For the last two decades, the most challenging science and engineering problems have been tackled by (often international) teams of researchers drawn together by common interests and expertise. Competition between groups and schools of thought is typically much more relevant to scientific discourse than competition based on national associations. For example, the 2000 Gordon Bell Prize, established to reward practical uses of parallel processing and given for the best performance improvement in an application, was won by an international team including

²TeraGrid.org, <http://www.teragrid.org/>.

³Pacific Rim Applications and Grid Middleware Assembly (PRAGMA), <http://www.pragma-grid.net/>.

⁴Distributed European Infrastructure for Supercomputing Applications (DEISA), <http://www.deisa.org/>.

⁵SETI@home, SETI@home.

⁶SETI@home Status: Search For Extraterrestrial Intelligence (SETI), <http://www.straddle3.net/context/int/i—001218.en.html>.

⁷Top500 List and site, <http://www.top500.org>.

⁸"The LINPACK Benchmark: Past, Present, and Future" by Jack Dongarra, Piotr Luszczek, and Antoine Petitet. Provides details of the benchmark and performance data for a number of machines. <http://www.netlib.org/utk/people/JackDongarra/PAPERS/hpl.pdf>.

researchers from the Max Planck Institute for Gravitational Physics in Germany, and researchers in the U.S. The prize was awarded to the team for using a globally distributed collection of supercomputers to solve Grand Challenge problems in Physics.⁹ The Gordon Bell competition is part of the first tier “Supercomputing” SC Conference, a technology and computational science-oriented meeting that has become a truly international venue. SC integrates globally linked activities during a week-long technical meeting and exhibition, guided by an international technical program committee which in 2003 included distinguished scientists from 10 different countries.¹⁰

Apart from individual efforts, many scientific disciplines are coming together as global communities in unprecedented ways to use technology to enable new discoveries. In High Energy Physics, scientists from around the world are coming together through the Compact Muon Solenoid (CMS) project, an international effort to upgrade the Large Hadron Collider (LHC) at the CERN particle physics laboratory in Geneva. The CMS project is one of the largest international scientific collaborations in history. Its goal is to bring protons into head-on collision at higher energies (14 TeV) than ever before achieved. The CMS experiments will allow scientists to penetrate further into the structure of matter and recreate the conditions prevalent in the Universe just 10–12 seconds after the “Big Bang”. As of mid-2003 2,300 people from 159 institutes in 36 countries, spanning Europe, the Americas, Asia, and Australia, were involved with CMS.¹¹ In September 2003, the project launched the LHC Computing Grid (LCG), a network of computers and instruments designed to handle the unprecedented quantities of data that will be produced by experiments at the facility. More than 12 petabytes of data—12 million gigabytes—will be generated each year, the equivalent of more than 20 million CDs. The LCG will meet the computational challenge of analyzing and mining this data by deploying a worldwide computational Grid, integrating the resources of scientific computing centers spread across Europe, America and Asia.¹² Analysis of this data will enable breakthrough discoveries critical to the entire High Energy Physics community.

Similarly, the Astronomy community is using the International Virtual Observatory Alliance to federate sky surveys from large-scale telescopes all over the world, including telescopes in the United States, Chile, the Canary Islands and Australia. The effort will provide a comprehensive whole-sky data collection that can be mined and analyzed for new information.¹³ Federating key astronomical data will make it possible to undertake studies that would otherwise require so much time and resources that they would effectively be infeasible. The ability to correlate massive data sets over a broad range of wavelengths, spatial scales, and time intervals will make it possible to efficiently search for rare and/or complex types of astrophysical objects and phenomena, and have already produced new discoveries.

Today’s team-oriented, global and virtual approach to science and technology provides tremendous potential for advances and discoveries, but is not well-represented by traditional notions of ownership, credit, etc. It is within this landscape, that China’s evolving science and technology programs must be considered.

Supercomputing in China

China’s rate of growth in supercomputing has been rapid. China has several supercomputer centers, the largest of which is CNIS (Computer Network Information Center) at the Chinese Academy of Sciences^{14,15} which currently has a staff of roughly 170. By comparison, NSF’s supercomputer centers in San Diego (SDSC)¹⁶ and Champaign-Urbana (NCSA)¹⁷ have roughly 400 staff and PSC in Pittsburgh¹⁸ has roughly 90 staff.

China has the domestic capability to build fast supercomputers and its current most powerful supercomputer is based on a commodity cluster model. The Chinese have nine supercomputers on the current Top500 list with the most powerful super-

⁹ Gordon Bell Prize, <http://www.sc2000.org/awards/>.

¹⁰ Supercomputing Conference Series, <http://www.supercomp.org/>.

¹¹ Compact Muon Solenoid (CMS) project, <http://cmsinfo.cern.ch/>; <http://cmsinfo.cern.ch/Welcome.html>; CMScollaboration/CMScollaboration.html.

¹² Large Hadron Collider Computing Grid (LCG), <http://info.web.cern.ch/info/Press/PressReleases/Releases2003/PR13.03ELCG-1.html>.

¹³ International Virtual Observatory Alliance (IVOA), <http://www.ivoa.net>; National Virtual Observatory (NVO), <http://www.us-vo.org>.

¹⁴ Supercomputing Center of the Computer Network Information Center, Chinese Academy of Sciences, <http://www.sc.ac.cn/english.htm>.

¹⁵ Computer Network Information Center (CNIC), Chinese Academy of Sciences (CAS), <http://www.cnic.ac.cn/english/about/index.html>.

¹⁶ San Diego Supercomputer Center (SDSC), <http://www.sdsc.edu/>.

¹⁷ National Center for Supercomputing Applications (NCSA), <http://www.ncsa.uiuc.edu/>.

¹⁸ Pittsburgh Supercomputing Center (PSC), <http://www.psc.edu/>.

computer, the DeepComp 6800, ranked 14th as of November, 2003. DeepComp 6800 is built by the Chinese Legend Group Corporation.¹⁹ The remaining 8 supercomputers are numbers 82, 90, 141, 163, 188, 435, 443, and 455 on the list and are built by Legend, IBM, HP and at Shenzhen University. China's first appearance on the Top500 list was in 1995 with an IBM computer at the China Meteorological Administration ranked 143. It was not until 2002 that the Chinese had a computer ranked higher (number 43 at the Chinese Academy of Mathematics and System Science), and on the most recent list China's submission occupies the 14th spot, preceded by machines deployed in the U.S. and Japan.

In addition to high-performance supercomputers, China is also moving into the area of Grid Computing. With the U.S. and others, China is a founding member of Pacific Rim Applications and Grid Middleware Assembly (PRAGMA),²⁰ and is developing its own national Grid projects, including the China National Grid (CNGrid) consortium²¹ and the China Grid Forum.²² China also participates in a number of collaborative network projects including the GLORIAD project,²³ which is linking U.S., Russia, and China in a global-ring network used for joint scientific and educational projects, the Asia-Pacific Advanced Network (APAN),²⁴ Asia-Pacific Grid (ApGrid),²⁵ and others.

Technology is receiving a big push in China, as it is all over the world, by access to and availability of information through the Internet. China's increasing interest in technology can be seen by its jump in Internet usage: In 2003, China's Internet usage rose 34.5% to 79.5 million web users, exceeding Japan for the first time, to claim the most Internet users in Asia. During that same year, sales of computers in China reached 17 million in the first nine months, nearly twice the 9.17 million sold in 2002, according to industry statistics.²⁶

The rapid march of technology is perhaps the largest factor affecting supercomputing in China. With the success of commodity cluster supercomputers, which China can build, and the growth of Grid Computing, China has a growing supercomputing capability, increasingly independent of U.S. export policies. In the areas of supercomputing and science, intellectual property protection and limited market access will not necessarily deter China's progress. The growth of open source software, and the scientific traditions of open exchange of information and international collaboration are the principal factors enabling science and technology in China, and as they are all over the world.

What does it take to be a leader in supercomputing?

More than any other factors, the key to leadership in supercomputing is the ability to make it a national priority, and to back it up with resources, commitment, and planning. For traditional high-performance supercomputers, the top spots on the Top500 list demonstrate a multiplicity of architectural models, uses, and institutional environments. What is common among all of them is the commitment of resources applied to their successful development and deployment.

Consider the Japanese Earth Simulator, number one on the Top500 list since June, 2002. Project planning started in 1997 and was funded at a U.S. equivalent of almost \$500 million for hardware development and deployment, housing and maintenance, human support and development, and scientific research. The Earth Simulator architecture is based on a parallel architecture model that has proved successful for high-performance codes for several decades. NEC's version for the Earth Simulator incorporates custom-designed chips capable of sustained performance of 35 trillion floating point operations per second (as measured using the benchmarks of the Top500 list). The scientific models run on the Earth Simulator are optimized community codes used by the ocean and atmospheric global modeling community as well as the solid earth community. The project required an invest-

¹⁹Top500 list, www.top500.org, compiled by University of Tennessee, University of Manheim, NERSC/LLNL; article in *People's Daily* at <http://english.peopledaily.com.cn/200311/19/eng20031119—128576.shtml>; *Recent HPC Activities in China*, Asian Technology Information Program Report ATIP03.035a 2003. <http://www.atip.org/public/atip.reports.03/atip03.014.pdf>.

²⁰Pacific Rim Applications and Grid Middleware Assembly (PRAGMA), <http://www.pragma-grid.net/>.

²¹China National Grid (CNGrid), <http://www.csis.hku.hk/clwang/grid/CNGrid.html>.

²²China Grid Forum, <http://www.chinagridforum.org/>.

²³GLORIAD Network, <http://www.gloriad.org/>.

²⁴Asia-Pacific Advanced Network (APAN), <http://www.apan.net/>.

²⁵Asia-Pacific Grid (ApGrid), <http://www.apgrid.org/>.

²⁶People's Daily, <http://english.people.com.cn/200311/08/eng20031108—127892.shtml..>

ment of hundreds of millions of dollars and sophisticated planning, organizational, and support infrastructure for a sustained period of years.²⁷

Today, many countries are working towards global leadership in science and technology and are building large-scale national efforts to achieve that leadership. For example,

- The European Union has embarked on large-scale pan-European projects to build high-performance and Grid technologies. Two major Grid efforts funded last year include DEISA (Distributed European Infrastructure for Supercomputing Applications),²⁸ which is connecting existing supercomputing centers into a Grid, and EGEE (Enabling Grids for E-Science in Europe),²⁹ which involves 70 institutions in 27 countries and is focusing on Grid middleware. These two large-scale efforts, with total funding of approximately \$63 million, include EGEE funding of \$38 million over two years for software development alone, involving “human infrastructure” of some 200 FTE (full-time equivalents).
- Japan is following its success with the Earth Simulator with a plan to build a very large 25+ teraflops Grid cluster connected by high-bandwidth networks. Vendors include IBM, which will provide the world’s most powerful Linux cluster supercomputer, to be integrated with other systems to form a massive, distributed computing Grid. The Japanese Grid is intended to enable collaboration between corporations, academia, and government and to support research in a variety of areas including Grid technologies, life sciences bioinformatics, and nanotechnology.³⁰
- Three years ago, the UK initiated a concerted effort to develop leadership in Grid Computing and middleware. Today, the UK e-Science program, funded at more than \$220 million over 3 years, is providing global leadership in many areas, including operational Grids and a major effort in open middleware (OMII) involving industry and the academic and research communities. The OMII vision, funded for 3 years at almost \$12 million, is to become a source for reliable, interoperable, open-source middleware, and is focused on moving research quality software into reliable, robust, usable software.^{31, 32}

Technology leadership in supercomputing rests on the ability to successfully fund, deploy and integrate resources and infrastructure at the largest scale; science leadership rests on the ability to do breakthrough work. Today, science and technology leadership have become intertwined, and the advances of each bootstrap the other to new heights. Both the United States’ and China’s success will be incumbent on an ability to bring national strengths and serious resources to build leadership. In today’s increasingly virtualized and integrated world, everyone is both a potential resource, and a potential competitor.

Thank you for the opportunity to testify today.

Co-Chair ELLSWORTH. Thank you so much, Dr. Berman.
Dr. May, if you will, please.

**STATEMENT OF MICHAEL MAY, Ph.D.
CENTER FOR INTERNATIONAL SECURITY AND ARMS CONTROL
STANFORD UNIVERSITY (ENERGY)**

Dr. MAY. Thank you very much. I appreciate the opportunity to present this testimony before this Review Commission.

I want briefly to apologize for the copy of my testimony that you have. When I circulated a draft of this testimony to my colleagues at Stanford, they made comments, which you can see in the margin. For some reason unknown to me these marginal comments survived in your copy when I sent electronically this testimony, but it did not survive when I printed mine. So you have an edge on me.

²⁷ The Earth Simulator Center, <http://www.es.jamstec.go.jp/esc/eng/>.

²⁸ Distributed European Infrastructure for Supercomputing Applications (DEISA), <http://www.deisa.org/>.

²⁹ Enabling Grids for E-Science in Europe (EGEE), <http://egee-ei.web.cern.ch/egee-ei/>.

³⁰ Japanese Grid information, <http://www-1.ibm.com/grid/grid—press/pr—730.shtml>.

³¹ UK e-Science program, <http://www.rcuk.ac.uk/escience/>.

³² “The UK e-Science Core Program and the Grid” by Tony Hey and Anne E. Trefethen, <http://www.rcuk.ac.uk/escience/documents/CoreProgGrid.pdf>.

What I'm going to have to say is not nearly so high tech as what you've heard so far this afternoon. I can't cover all of the energy sector. I don't have experience in all of it. I'm going to focus on three areas, which are of particular interest: China's role in the oil markets, China's electricity sector and some of the domestic and international factors that support and constrain China's energy development. I'm going to start with oil. There's been concern, of course, in many publications about Chinese oil consumption draining the world oil resources.

The world oil resources are not going to be drained, although the production of conventional oil is probably going to level off sometime in the next quarter century; opinions differ as to just when.

That is likely to strengthen the OPEC monopoly or any successful monopoly in the Gulf States. It's likely to keep prices above or around present, very high real levels, and it's likely to increase investments in synthetic production and alternative transportation fuels. This is likely to happen regardless of what happens in China.

China currently accounts for about 6 percent of world oil consumption and provides about half of that from domestic reserves. So it's not a big factor in the market today. The domestic reserves in China are peaking, however. The new domestic sources there are uncertain and likely to be expensive.

Oil consumption in China, as is well understood, is growing about four times as fast as oil consumption in the world as a whole. If that pattern continues, China should be as large a consumer of crude oil as the United States sometime after 2030.

China, of course, is not alone in the fast-growing consumer of oil. It's the largest of several large and growing Asian oil buyers. It is not clear, as I think everyone understands, that this high consumption growth pattern is going to continue uninterrupted for the next 25 or 30 years. A number of factors could interrupt it.

It could be economic downturns in China or in the world or both. In fact, if you look ahead a quarter century, it's almost certain that there will be some period of economic downturn. The long-term rise in the price of oil, which OPEC is maintaining and is likely to maintain in the future, could lead China further in the direction of favoring fuel economy, a direction in which it has started recently, and in the direction of producing synthetics from its own large coal and shale reserves, processes with which China has long been familiar. And that same high price is going to give further incentives to the advanced western economies to pioneer new transportation fuels. Even with an uninterrupted growth, even with the kind of linear growth that we see in many forecasts, China is unlikely to be as major a factor, as influential a factor in the oil market as the United States is now and is likely to remain.

The United States has a number of ways to influence the world market, as I think we all know. Through buyer power, the United States is by far the largest buyer of oil, and it can change that through its own internal regulations. Through new technologies in bringing oil to market, western companies led by the United States companies have lowered the marginal cost of bringing oil to market over the past several decades by a factor of four in real terms. And, also, the United States is influential, of course, with security and other arrangements with suppliers.

China is trying, but China is unlikely to have enough spare capital and is unlikely to have enough military power to compete along all these lines for a number of decades, if ever. What's more likely, I think, is that China is going to continue its present approach, which is a mix of strategic and market oil buying. The major effect of China on the world oil market, in fact, is likely to be less in their buying of oil and more in their pursuit of upstream control of crude sources in a variety of places, such as Sudan, Central Asia, Venezuela, Iran, and they attempted in Russia, but were not successful. There is a considerable debate going on in China, which I reference in the references, as to which way to go, whether to rely on the market and get the cheapest supply or whether to adopt strategic approaches which might perhaps assure oil supply in difficult times. I think they're going to continue with the mixture. This is going to lead them to overpay somewhat for their oil resources. And, of course, they're not the only ones who are overpaying for oil resources for strategic reasons. I will say a word about natural gas. China is making heavy investments in pipelines and liquefied natural gas facilities in order to increase its current minimal use of natural gas. It has some gas of its own, enough to start with; but if consumption increases significantly, it's going to also depend on imported gas from Australia, Indonesia, Russia and elsewhere. Speaking of Russia, perhaps the most important strategic energy development of the past year or two in Asia has been the decision by major Japanese utilities to buy gas on long-term contracts from Russia. China is considering similar contracts.

Russia is likely to increasingly come to be a key supplier of gas to East Asia as it has long been to Western Europe. It's not a particularly Chinese development, but it's a major development with respect to strategic use of resources in East Asia.

Electricity. China has the second-largest electrical power industry in the world today, somewhat less than half the size of the United States, measured in terms of generating capacity. The U.S. grid isn't up to 21st century demand, as we noticed recently, but China's grid is not nearly as capable as the U.S. grid, particularly not in terms of its ability to transport large amounts of electricity reliably across the country.

China's commercial electric power is mostly derived from coal, about 70 percent, compared with about 55 percent for the United States. Most of the rest of the electricity in China is hydroelectricity, with small contributions, a few percent, from nuclear and from oil plants. There's also quite a bit of noncommercial electricity generation using various fuels in China. This is likely to continue. Coal reserves are inexpensive comparatively and abundant. The main cost of using them is the transportation cost.

Hydropower is also likely to continue as the second-largest contributor to the electric grid for some time. China is planning several Three Gorges-sized stations to be built successively upstream in the southwest. And there's a question mark as to how fast and how many of these are going to be realized.

So far as technology is concerned and the role of foreign investment, the picture is quite mixed and is changing, not unlike the picture elsewhere.

The largest coal-fueled power plants are modern, with turbo generators and control rooms from vendors around the world—Siemens, Westinghouse, Hitachi, Phillips—as well as indigenous equipment.

They all have electrostatic precipitators, which abate the particulates. Most of those work. None of them, essentially none, have desulfurizing equipment, although low-sulfur coal is generally used in the larger modern plants. Most of the pollution which you read about in China come from smaller and older plants, of which there are plenty, and from the direct use of coal for industrial purposes in building heating, which is going down in the major cities. It is not likely to change very fast. Continuing use of smaller, older plants is built in politically in the way power is allocated to various plants in China, and it is changing, but slowly.

Nuclear plants have more than doubled in the past few years, but nuclear power remains a very small part of generation at around 2 percent compared with 35 to 40 percent for Japan and South Korea.

France, Canada and Russia and China itself have provided most of the nuclear equipment. Natural gas-fueled electric generators, which are minimal now, are slated for a large increase. Foreign suppliers such as Shell, General Electric and BP are providing most of the infrastructure. China is increasingly acquiring the technology, but, again, this is proceeding quite slowly.

As to the factors that support and constrain China's energy development, the most important factor, obviously, is its economic growth. Energy and economic growth are synergistic in all countries.

The next most important factor affecting the electricity development, and, in general, energy development is the availability or, rather, the lack of availability of a long-term capital market.

In the electricity and gas industries, adoption of efficient, cost-effective, less-polluting technology is held back by the lack of ability to sell long-term bonds and stocks. And that, in turn, is held back by the lack of transparent accounting to the Chinese and foreign public, something that was touched on earlier in the day.

As a result, most of the construction is financed by either 15-year bank loans, which rules out improvements that only pay off in 30 to 40 years, or as by government or foreign financing. Direct government involvement has indeed been a major supporting factor in introducing modern plants. Without it, energy development would lack the market support necessary to keep up with the economic growth. I won't touch on the capital market problem in China given the shortage of time, but it's a deep-seated problem and it is tied to the fact that the banking industry and the state-owned enterprises to which the banks make loans are, in general, not financially viable.

From a technological point of view, the energy industry is not a high-tech industry, not yet at least. There's little that the Chinese could not do technologically if they wanted to and had the capital available. They're on a steep learning curve regarding gas pipeline technology and allied technologies. Their electric grid and grid control technologies however are not up to modern standards. Those could not support widespread deregulation, which some in China

are talking about. I don't think such widespread deregulation is going to happen very fast.

So at the bottom line the major problems in the energy sectors in China are transition problems: how to transition to long-term private financing, how to transition to less people-intensive operations, how to match infrastructure growth to short-term profitable commercial growth.

So far as resources are concerned, China will probably find itself increasingly in a situation of partial dependence on Middle East and Russian suppliers, a situation similar to that of other developed countries but, I believe, on a less favorable footing for a long-term time, than the United States.

I will say one closing word on global climate change. At present, China emits about half as much as the United States in greenhouse-gas emissions, about a tenth as much per person; but China's emissions are growing faster, about 2 1/2 percent per year, compared to 1 1/2 percent for the United States and 1 percent for the world. China, again, is only one, although the largest, of several large future potential contributors to climate change. Any future aggressive action on this goal is going to create pressure for some kind of action on the part of China, India and other less-developed countries. And this, in turn, would inevitably put pressure on coal, particularly the inefficient coal applications that are abundant in China and the other LDCs.

Thank you very much.

[The statement follows:]

**Prepared Statement of Michael May, Ph.D.
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I appreciate the opportunity to present this testimony before the hearing of the U.S.-China Economic and Security Review Commission.

As I understand it, my job is to give the Commission an assessment of the current technological capabilities of the energy sector in China; how the sector will develop in the future; and what role foreign companies, investors, and scientists and engineers play in the sector. The Commission is also interested in learning what domestic and international factors promote and constrain the development of energy in China, in particular any constraints created by inadequate intellectual property protection and market access limitations. Another Commission interest is whether Chinese firms and other organizations are investing overseas as a way of transferring technologies to China.

This is a tall order and I will only be able to address a part of it based on my experience in China and with the energy sector and its security dimension in general. I will concentrate on three areas: China's role in the oil markets; China's electricity sector; and some of the domestic and international factors that support and constrain China's energy development. In each area I will try to point to one or more important bottom lines.

Oil

I start with oil, because there has been concern about Chinese oil consumption draining world oil resources. World oil resources will not be drained, although production will probably level off sometime in the next quarter century. That will strengthen the OPEC monopoly, keep prices at or above present levels, and increase incentives for investment in synthetic production and possible alternative transportation fuels. But this is likely to happen regardless of what happens in China.

China currently accounts for about 6% of world oil consumption and provides over half of that from domestic reserves, so it is not a big factor in the market today. The domestic reserves are peaking however, new domestic sources are uncertain and likely to be expensive, and oil consumption has been growing about four times as fast as the rest of the world. If that pattern continues, China should be as large a consumer as the US some time after 2030.

China is not alone in growing fast. It is the largest of several large and growing Asian oil buyers. China and other growing Asian countries could become more rather than less dependent on the U.S. and other advanced Western technologies as the price of oil stays high or goes higher, assuming the appropriate investments are made in the West.

It is not at all clear that the high consumption growth pattern will continue. Several factors could interrupt it: there could be economic downturns in China or the world or both; the long-term rise in the price of oil which OPEC is maintaining and is likely to maintain in the future could lead China further in the direction of favoring fuel economy, a direction in which it started recently, and in the direction of producing synthetics from its large coal and shale base, a process with which it is familiar; and that same high price will give further incentives to the advanced Western economies to pioneer new transportation fuels.

Even with uninterrupted growth, China would be unlikely to become as major a factor in the oil market as the US is now and will probably remain. The US influences the market in several ways, through buyer power, through new technologies for bringing oil to market, and through security and other arrangements with suppliers. China is unlikely to have enough spare capital or military projection power to compete along all these lines for several decades if ever.

What is more likely is that China will continue its present mixed strategic and market approach. The major effect of China on the world market may be felt less in their buying of oil than in their pursuit of upstream control in a variety of places such as Sudan, Central Asia, Venezuela, Iran and an attempt in Russia. This concern over energy security leads China to overpay for resources. Of course, China is not the only country to overpay for strategic resources through various mechanisms.

A word about natural gas: China is making heavy investment in pipelines and LNG facilities in order to increase its current minimal use of natural gas. It has some gas of its own, but, if consumption increases significantly, it will also depend on imported gas, from Australia, Indonesia, Russia and elsewhere. Perhaps the most important strategic energy development of the past year in Asia has been the decision by major Japanese utilities to buy gas on long-term contracts from Russia. China is considering similar contracts. Russia may increasingly come to be a key supplier of gas to East Asia as it has long been to Western Europe.

Electricity

China now has the second largest electrical power industry in the world, at something less than half the size of the U.S. industry, measured in terms of generating capacity. Neither grid is in terribly good shape, but, much as the U.S. grid needs to be brought into the 21st century, China's grid is still not nearly as good in terms of its ability to transport large amounts of electricity reliably across the country.

China's commercial electric power is over 70% derived from burning coal, as compared with 55% for the U.S. The rest is hydroelectricity, with small contributions from nuclear and oil plants. There is also significant and poorly measured non-commercial generation, with various fuels. For the future, there is considerable investment in providing gas for combined cycle gas-fueled plants and the nuclear component has more than doubled in the past few years, but coal and hydro are almost certain to dominate generation for a decade or more longer. Coal reserves are large and the main cost is to provide transportation from the mines to the consuming centers.

China is counting on more hydropower and planning several Three Gorges-sized stations to be built successively upstream in the southwestern area. Their overall economic, social and ecological impact is not well known. A more transparent decision-making process may delay the construction.

So far as technology and the role of foreign investors are concerned, the picture is mixed and changing, something that can be said of Chinese industry across the board. The largest coal-fueled power plants are modern, with turbo-generators and control rooms from such vendors as Siemens, Westinghouse, Hitachi, and Phillips, as well as indigenous equipment. They all have electrostatic precipitators, most of which so far as I saw are working. Essentially none has desulfurizing equipment, albeit they use predominantly low-sulfur coal and there is interest among utility operators in purchasing such equipment from the U.S. and elsewhere if the proposed tax on sulfur emissions is adopted.

Most of the pollution comes from smaller and older plants, some dating back to the fifties and of Soviet origin, and from direct use of coal for industrial purposes and building heating. A review of changes past and proposed in coal-fired electric plants in three provinces shows a bifurcated distribution, with efficient large new plants and continued use of locally owned inefficient smaller plants.

Nuclear plants have gone from 3 to 8 in operation in recent years with 3 more under construction, but nuclear power remain a small part of overall generation, about 2%, compared with Japan and South Korea where nuclear power provides about 35% of total power. Foreign vendors (France, Canada, and Russia) have provided most of the nuclear equipment in the plants but several of the new plants are Chinese-built.

Gas-fired electrical generators, minimal now, are slated for a large increase but will not be a big part of generation for the coming five or ten years. Foreign suppliers such as Shell, GE and BP are providing much of the gas infrastructure. As in all other cases, China insists on technology transfer rights that will enable it to make such equipment itself in the future, in line with what other developing countries have done.

Factors that Support and Constrain China's Energy Development

The most important factor in Chinese energy development is its economic growth, the two being synergistically related as in all developing countries. The next most important factor affecting the energy development is the availability or lack of a long-term capital market. In the electricity and gas industries particularly, adoption of less polluting and more cost-effective technologies is hampered by the lack of ability to sell long-term bonds and stocks based on a sound transparent accounting to the Chinese and foreign public. Much new construction is financed by 15-year bank loans, which rules out improvements that pay off only over the 30–40 year life of the plants. Only if government or foreign financing is available are such plants built. Direct government involvement, through the state-owned oil, gas and electric power companies, has been a major supporting factor. Without this backing, energy development would lack market support including but not limited to financing. The transition from government operation to market in the energy sector will be a long process.

The capital problem is tied to the problems in China's banking industry, and, in turn, to the State-owned enterprises to which many of the banks' loans are directed. In my visits to utilities and provincial planning groups across the country, this factor has been a continuing presence. The financing problems are also in part due to the fact that higher short-term returns are to be found outside the energy industries.

From a technological point of view, while I am far from an expert in many facets of the energy industry, my impression is that there is little that the Chinese could not do, given the necessary investments. They are just now getting to manufacturing the largest turbo-generators and they are behind both their Japanese and South Korean neighbors in manufacturing nuclear components. They are also on a steep learning curve regarding gas pipeline and allied technologies. Their electric grid and grid control technologies are not up to supporting widespread deregulation and the consequent large-scale trading of electricity. There is a lot of talk and activity along that line, but my impression is that not much will happen, or should happen, very fast.

A Bottom Line

The major problems in the energy sectors in China today are economic and political transition problems: how to transition to long-term private financing, how to transition to less people-intensive operations, how to match infrastructure growth to short-term profitable commercial growth. So far as resources are concerned, particularly oil and gas, China will probably find itself in a situation of partial dependence on Middle East and Russian suppliers, similar to that of the developed countries, albeit less favorable than the U.S. The likely long-term rise in oil prices will steer users to conservation and alternative fuels, in which case China will not be worse off than others, but technologically advanced countries will have an edge.

A closing word on global climate change. At present, China emits about half of U.S. greenhouse-gas emissions per year, about a tenth as much per person, but China's emissions have been growing faster, about 2.5% per year versus 1.5% for the U.S. and 1% for the world as a whole. Again, China is only the largest of several large future potential contributors to climate change. Any future aggressive action on greenhouse gas emissions abatement would create pressure for some kind of action for China, India and other LDCs. This would lead inevitably to pressure on coal, especially the inefficient coal applications that are abundant in most LDCs.

I am grateful to my colleagues at Stanford, particularly Professor Thomas Heller, Dr. David Victor and Dr. Chi Zhang, for their help and insights.

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Panel IV: Discussion, Questions and Answers

Co-Chair ELLSWORTH. Thank you, Dr. May, Dr. Berman, Mr. Dedrick and Mr. Bold. Thank you very much indeed.

Commissioner Robinson has some questions or a question.

Chairman ROBINSON. Thank you, sir. Thank you, Mr. Co-chairman. I have a quick question for Mr. Bold and one for Dr. Berman, if I might. Mr. Bold, I was intrigued by the—what is a big story, that is, that China has gone ahead with its own standard. I can't quite remember the acronym off the cuff, but you'll forgive me there.

Mr. BOLD. Sure.

Chairman ROBINSON. But as you mentioned, it's largely, I would guess, based on QUALCOMM's standard. You mentioned the term tweaking with some Chinese vendors and possibly Siemens and other foreign suppliers that helped bring this to the floor, that it would be exported, that—and then you said something surprising to me, that QUALCOMM was basically encouraging of that development. I'm just wondering if there was any kind of residual feeling in the company at a certain point along the trail that the tweaking wasn't altogether copacetic and may have been a little bit troubling to QUALCOMM at one time because of the similarity of the standards and the feeling that this thing had been built at your prodigious expense.

What was—am I off base there or—

Mr. BOLD. Well, to answer that, talk a bit about the nature of our intellectual property portfolio and then the nature of the technology in question. CDMA is a spread spectrum technology. It actually—its antecedent is actually some military communications research coming out of World War II dealing with jamming of communications channels.

What the founders of our company did was took the concept of spread spectrum and turned it into a platform for mobile communications. So that the intellectual property to which I referred, I used the word essential. And indeed a number of the patents that we hold are essential to any spread spectrum technology, any variant of CDMA. And, in fact, there is a variant that is beginning to be used in Europe known as wide band CDMA, for which we have already consummated a number of licenses with European vendors who are paying us royalties for the equipment. So with that as a backdrop, it explains why we weren't terribly concerned when another variant was developed in China.

Now, this is different still, and I won't go into the technical details, but basically most cellular systems have what they call a forward and reverse channel. So when you talk on the cell phone, your call is going in one direction. Then it comes back in another direction from the tower. This variant doesn't have that feature. So it makes it a little bit different still, but it is still a spread spectrum technology, and we have been very public in saying that our IPR is essential for it.

We actually have—we're a founding member of the TD-SCDMA forum, which is group of American, European and Chinese businesses looking to figure out how to develop this technology and make it commercial.

It's not really clear what applicability it will have either in China or other international markets. We believe, for example, it's not really appropriate in the same way that a wide-area network technology like CDMA is here in the United States.

It might be more useful in smaller areas, like apartment buildings or what have you; but it's certainly yet to be commercially proven.

The reason I said it's encouraging is that as a major holder of IPRs, it's good to see the Chinese develop their own IPR, go into international markets, have a stake in fair treatment of those IPRs in accordance with TRIPS and other agreements. So that's one of the reasons I think we view it favorable.

Chairman ROBINSON. That makes perfect sense.

Do you have anything going with Huawei as one of the Chinese vendors right now?

Mr. BOLD. We do. We have a licensing agreement with Huawei. And as part of that agreement, we not only have the legal framework that allows them to develop CDMA equipment, we also have a number of—and this is true of all Chinese vendors and, in fact, all of our licensees—we have a technical consulting relationship where we actually work with them to help develop the products. Because at one point QUALCOMM, in fact, made the phones. We made the network equipment. We've got a lot of residual knowledge. And Huawei has, in fact, been one of the more successful

companies along with, I would say, ZTE in developing fairly innovative products.

Chairman ROBINSON. Controversial company at some level. You know, the Cisco experience and—

Mr. BOLD. Sure.

Chairman ROBINSON. —Air Defense Command in control allegedly in Afghanistan, Air Defense Command in control, Iraq.

Mr. BOLD. Yes.

Chairman ROBINSON. And I assume that QUALCOMM is alert to that and has safeguards in place and understands the military utility.

Mr. BOLD. We do. We absolutely do, as does the U.S. Government.

Chairman ROBINSON. Well, as my time is up, I'll probably have to miss my supercomputer question, but we'll come back along the trail. Thank you.

Co-Chair ELLSWORTH. Thank you, Commissioner and Chairman Robinson. Commissioner and Vice Chairman D'Amato, please.

Vice Chairman D'AMATO. Thank you, Mr. Chairman. Mr. Dedrick, the Chinese seem to be using their distribution systems as a way to encourage and give an unfair advantage to their domestic industries for their own market. Legend has a 30 percent market share.

Is that not a violation of the WTO agreement against unfair nontariff trade barriers?

Mr. DEDRICK. Well, I'm not an expert on the WTO, but I don't think there's anything illegal about building your own distribution network. The Chinese government didn't build the distribution network; Legend created its own. The same thing happened in Japan. NEC and Fujitsu built their own franchise dealerships and so on, and they did it at a time when land was cheap. So they got an advantage that if a foreign company wants to go in now and try to do the same thing, it would be much more expensive. Again, not being an expert on trade law or anything like that, it doesn't seem to me that it would be relevant since it wasn't something created by the government.

It's Legend's own sort of proprietary network, which gives them an advantage in their market.

Vice Chairman D'AMATO. Yes, but the problem is the government won't give the same kind of distribution rights to competitive companies in the United States, and that's an unfair trade nontariff barrier in violation of the WTO. They're doing it on automobiles as well. It's a very serious violation. On the question of the VAT tax rebate, is it your view that that is also—or is that a violation of the WTO ban against subsidies?

Mr. DEDRICK. Again, I think you have to ask somebody else about WTO violations. It's really not my...

Vice Chairman D'AMATO. Do you think that the VAT tax rebate will tend to force foreign chip companies to relocate into China in order to avoid the tax, or is that a purpose of that tax, do you think?

Mr. DEDRICK. I think that there's a lot of reasons to locate component production in China. Some of it has to do with government regulations. I'm not going to say whether this is contrary to WTO

or anything, not being my expertise, and that may be something that would come up in a WTO case. I'm not sure. But I can tell you that the computer makers are encouraging their suppliers to move into China for various reasons. One is they get local content, which government officials like, but also because it lowers their cost. The computer industry is very competitive. When you have a computer selling for \$600, every penny you save counts. And the difference in cost between producing in Taiwan and China may not be saving that much, but with the kind of margins the companies are facing, that may be the difference between making and losing company.

Vice Chairman D'AMATO. I think the VAT tax is 14 percent. Is that substantial enough to change a competitive position?

Mr. DEDRICK. Sure. 14 percent of what would be the question.

Vice Chairman D'AMATO. Yes, of the price of the good, tax on the price of the good.

Vice Chairman D'AMATO. Do you have, Mr. Bold, any view on this or does your company have any view on this question of the VAT tax. It's not really in your domain perhaps.

Mr. BOLD. No, not so much. Again, as a company that does not manufacture, but really is more of a developer of technology, we've not taken a position on that, no.

Vice Chairman D'AMATO. One last question. Mr. Bold, has QUALCOMM over the last two years or so had any plans to locate any new R&D facilities into China?

Mr. BOLD. No. Our investment in China, we have an office in Beijing, is fairly small by multinational company standards, that's primarily involved with sales, business development, marketing.

We do have some technical teams, but their role is to provide assistance to the Chinese companies, as I mentioned. So it's not as though they're doing design of products. In fact, QUALCOMM is somewhat unique in its concentration of employees here in the United States. Very much an idea the founder had to, you know, keep the R&D facilities collocated to, you know, basically have more interaction. So the overwhelming majority, I think it's more than 90 percent, of our employees are here in the United States, and that's where we do the design.

Vice Chairman D'AMATO. Thank you very much. Thank you, Mr. Chairman.

Co-Chair ELLSWORTH. Thank you, Commissioner D'Amato.

Commissioner Wortzel, please.

Commissioner WORTZEL. Thank you very much for the testimony today.

I have a question broadly about supercomputers that comes from Dr. Berman's testimony. You know, they have great applications for missile and weapons design. In the 1980s in particular, the Department of Defense went to great effort to keep the Soviet Union from getting them or from being part of a geophysical network because they can be used to model firing points and submarine-launched ballistic missile applications, but—and you've really got some interesting facts in there, that China is No. 14 out of the top 15 right now, and that its supercomputing capability is increasingly independent of U.S. export controls.

So my question—and I would leave it to any of the three of you or all of you to respond, is there any reason today for national security purposes to maintain export controls on supercomputing or software applications? Because this has been a real subject of debate in the Congress and particularly in the commerce committees. And I would just be interested in your views on it.

Dr. BERMAN. My own feeling is that with respect to the technology, the design of complicated software systems required to link things together and run supercomputers—everyone has the same knowledge. It's a global community. The same information is generally available throughout the academic community. Scientists, have much stronger boundaries in terms of their own schools of thought, than they do have national boundaries.

Leadership comes from the ability to prioritize, the ability to put resources behind a decision, the ability to make a commitment to establishing a priority and to go to the mat with it.

Leadership today does not come from the technology secret or the software secret that one might have that somebody else doesn't have. So I believe that export controls don't accomplish the purpose that you want.

Commissioner WORTZEL. Well, I appreciate that.

Dr. BERMAN. I think that the goal that you want is accomplished by making sure that the U.S. is a leader.

I think now the U.S. has immense raw materials and potential to keep and maintain leadership, but we're falling a bit behind because of the priorities we're putting towards these areas, not because we have secrets or because they have secrets that we don't.

Commissioner WORTZEL. Dr. May, please.

Dr. MAY. Yes. I just want to add one comment to Dr. Berman's comments. The supercomputers of 1980 were no better than what you can find in a routine advanced laptop or desktop today. And at the time there was reason to be concerned about exporting those. Those were necessary to design nuclear weapons or advanced nuclear weapons and the like. Now everybody's got that capability. And the supercomputer that Francine is talking about, enormously more capable and well beyond that and based on generally understood type of principles.

Commissioner WORTZEL. Well, I appreciate it. I get called a lot on these things by staffers, and that's where I came down. I said, don't bother. You know, that was kind of an intuitive thing. But you've got a little bit more knowledge about the subject than I do. Thanks.

Dr. BERMAN. You're welcome.

Co-Chair ELLSWORTH. Thank you, Commissioner. Commissioner Becker.

Commissioner BECKER. Thank you, Mr. Chairman.

Two of my questions have already been answered so it makes it a little bit easier on me. I have one right now.

Over the last several years we've had other information technology panelists that have talked to us. And we've received testimony that American companies or international companies have helped China develop sophisticated surveillance techniques in computer blocking which they use to spy on their own citizens for whatever reason. My question to you is, would you think this is a

proper activity for American companies that are located in China like yourself? And if not, what would you suggest to stop that or to deal with it?

Mr. DEDRICK. Well, that's a good question. I think that there's probably limits when an American company sells technology to a customer in China to how much they know how the technology's going to be used.

Certainly if a Chinese customer or government agency or someone wanted a company to go in and say, develop me a surveillance technology that I can use to spy on these people, yes, you might think that they wouldn't want to participate in that, but you can just develop technologies that can be used for that. You can sell technologies that may be used for that. I think that's almost the same issue that comes up with the security question, you know. Technology is technology. It's the person that's using it or the organization that's using it that makes the difference.

And as a vendor, how much control do you have over that? I'm not saying that vendors don't sometimes look the other way or something like that, but a lot of times I think they're selling some basic technology and—QUALCOMM sells a tracking technology for trucking companies. Well, you can keep track of where all the trucks in your fleet are. If somebody wanted to keep track of individuals, they could possibly use a similar technology.

Commissioner WORTZEL. I had that in the mirror of my car when I was in China.

Mr. DEDRICK. Well, rental cars have that—

Commissioner BECKER. Have any of your companies ever participated in anything like that?

Mr. BOLD. We have not, no.

Commissioner BECKER. Are you aware of other companies doing that?

Mr. BOLD. Not specifically. In the tracking technology that was referenced is—well, just in practical terms, it's a big satellite antenna that goes on the—if you ever drive by trucks, you're familiar with it. On the highway you'll see what looks like a casserole dish on the top of the cab, inverted with a stubby antenna.

And what the trucking companies do is use that primarily for fleet efficiency so they can know where their trucks are, you know, at any given time.

What's interesting, though, is that it's now being used by the United States Government in limited use for Homeland Security applications for tracking hazardous materials carriers. In fact, we've actually developed a technology, not to go into a commercial here, but—that allows for disabling of trucks. If a truck is hijacked and you can't communicate with the cab, you can actually shut off the fuel valve. That's not a product that we've introduced in the Chinese markets. I'm not aware specifically, you know, of any discussions we've had. But it's hard to know how that would be used for, you know, surveillance purposes exactly. It's really a commercial application.

Commissioner BECKER. Dr. Berman, anything? Any comment?

Dr. BERMAN. I don't have the expertise required to respond to this question.

Commissioner BECKER. We've never had a company acknowledge that they've done such a thing.

Dr. BERMAN. I think we're fortunate in the scientific community because most scientists freely collaborate with one another and are really more intent on cracking the hard problem than they are in looking at these other issues.

Commissioner BECKER. Thank you.

Co-Chair ELLSWORTH. Thank you, Commissioner Becker. Commissioner Mulloy.

Commissioner MULLOY. Mr. Bold, I remember—I think Secretary Daley was very helpful in getting your technology into China, was he not?

Mr. BOLD. Yes, he was. Yes.

Commissioner MULLOY. So, in other words, government can play a positive role in these things from time to time.

Mr. BOLD. Absolutely.

Commissioner MULLOY. Now, this question is for Mr. Dedrick. You point out on page 4 of your testimony that China's drive to create a commercially oriented computer and electronics industry began in 1978–1986 with the Seventh Development Plan. In that and subsequent plans, China's electronics industry was given special emphasis and support as a pillar industry that leads the development of the entire economy. Do you think the Chinese were successful in that?

Mr. DEDRICK. Certainly the electronics industry is leading the development of the economy in a lot of ways.

I think as someone has brought up this morning, sometimes it was in spite of the policy. Sometimes it was supported by the policies, as any of the industrial policies—we find that a lot in studying industrial policy in East Asia. We find more unintended than intended consequences. And sometimes the unintended consequences are good; sometimes they're bad. But a lot of times government directed industrial technology policy doesn't end up going exactly where the government thought it was going to go and has different impacts. But policies like training engineers, putting resources into infrastructure, the Golden Projects, things like that, probably were beneficial.

Some of the other efforts, like, sort of promoting national champions, were not too successful.

Commissioner MULLOY. They're certainly a heck of a lot further along in both electronics—in fact, we import a lot of electronics, commercial electronics and computer, from China into the United States.

Dr. Berman, you make a similar point in you saying that for supercomputers, you really need a national effort. You make the point, many other factors, the key to leadership in supercomputing is the ability to make it a national priority. And then you talk about other governments funding in particular certain sectors of the economy because that helps that sector take off and then has a lot of add-ons for everybody else.

Dr. BERMAN. Yes.

Commissioner MULLOY. So what I'm understanding here when we talked about we lost certain industries and people say don't worry about it because we're moving up the food chain, and we

heard the pharmaceutical industry in here before, and we heard that the Chinese have national policies to develop their own pharmaceutical industry.

Do you get a sense—do we have—do you have any sense that we need some kind of more national understanding of how we're situated in this global economy and should be thinking more coherently nationally on how we compete in this global economy?

I would just like to go right down the line: Mr. Bold, Mr. Dedrick, Dr. Berman, Dr. May.

Mr. BOLD. I think greater coherence, greater awareness on a national level of that question is always a good thing. You know, there's a reason that QUALCOMM is located where it is, and that reason is the university in which we sit. And the other reason is the availability of venture capital that allowed the company to grow and become as successful as it has.

Those are our two core, you know, competencies, our two critical advantages. And the extent to which American policy supports the continued growth of both basic and applied research in universities and the free availability of venture capital through the Tax Code and other things, I think it will benefit American competitiveness in the absence of some sort of national strategy that we see in East Asia and other markets.

Commissioner MULLOY. Do you have anything to add, Mr. Dedrick, or Dr. Berman?

Mr. DEDRICK. Yes. I agree with that. I think that the strengths that we have, we need to build on. Things like venture capital, things like our university system, our national innovation system, continue to give us leadership. And I think we need to build on those.

I don't think sort of a—you know, a centrally planned kind of industrial policy in the economy of this size is—

Commissioner MULLOY. We're not talking that, no.

Mr. DEDRICK. And I think the other thing I would call for is more of an awareness of what's happening outside the United States. I think people in the U.S., people in the electronics industry and a lot of industries tend to be very parochial.

The U.S. is a big market and people are sort of vaguely aware of what's happening in other parts of the world. And the government, through supporting research and so on, can play a positive role in that sense.

Dr. BERMAN. That's an excellent question.

I think in the science and technology area we're really in danger of falling behind. The Japanese Earth Simulator, I think, was a wake-up call to this country.

The fact is that I don't think we have a coordinated, sustainable vision right now for science and technology. There's a lot of thrashing within the academic community. There's a lot of thrashing with respect to leadership in a number of scientific and technology disciplines.

The U.S. has been the intellectual leader for many years. Other countries are catching up to us because they have sustained effort and vision, and, of course, we all share the same global information and knowledge.

So it's worrisome for the science and technology community in the U.S. right now because I think if we don't get our act together and really develop a cohesive, coordinated national vision, that we really will fall behind.

Commissioner MULLOY. Dr. May, do you have anything to add?

Dr. MAY. I agree with the other panelists. And I would actually make it stronger.

I'm—I guess you would call me a veteran of the Cold War, at least in the nuclear aspects of it and others.

We did not stay ahead because we could keep secrets better than the Soviet Union. They kept secrets much better than we did. We had open debates on all kinds of things. We stayed ahead where we did because we had an open, competitive process which was backed by a lot of resources, and we just moved faster on a number of fronts, not all fronts.

And I think that's true everywhere. The answer to some of the concerns which Commissioner Becker and others have raised is, we can't keep this stuff. It's all over the world. The Chinese can certainly build their own truck- and car-tracking system without any help from us and so on.

We just have to keep moving faster and more intelligently. That's the only answer. And that involves support—continuing our open system and support to research and education, reaching all the way down to grade school. Our children and grandchildren tend to waste many of the formative years which they could spend learning more about everything, including math and science. Wholesale reform is what's needed. Teachers there have to be paid more. The whole thing has to be done better.

Commissioner MULLOY. And it comes at some vision of national leadership, doesn't it, with a vision of where we're headed?

Dr. MAY. Yes.

Co-Chair ELLSWORTH. Thank you, Commissioner Mulloy. Mr. Reinsch.

Commissioner REINSCH. Thank you. Well, first, in light of Commissioner Becker's last question, I think it's appropriate just to make the point for the record that we're talking about dual-use equipment. Dual-use equipment by definition has two uses: civilian and military, or benign and not so benign. This kind of question comes up all the time. If we're going to take the position which the United States Government has never taken, that anything that might possibly have some not-so-benign application shouldn't be exported, that would make an enormous change in our policy and would have an enormous economic impact. There are always risks. The licensing process assesses the risks and tries to make intelligent decisions in light of what those are. In that regard, Dr. Berman, I want to thank you for your absolutely brilliant answer to Commissioner Wortzel's questions about export controls. It saves me a lot of work. The last administration came to precisely that conclusion and said so. Unfortunately, it said so on January 19th, 2001, and we didn't have as much success as we would have liked in persuading the current administration to believe that we were right. But I'm glad that you and also Dr. May have said what you've said.

Perhaps you'll have more of an impact than we did. Let me ask you, Dr. Berman, one question, and then I have one for Mr. Dedrick, as well. For you, Dr. Berman, have the Chinese—to your knowledge, have the Chinese done any work—are they doing any work on vector supercomputing?

Dr. BERMAN. I was trying to get some information about that before I came today. To my knowledge, the work is really mainly in big commodity computers with fast interconnects.

Commissioner REINSCH. Okay. Thank you. That's helpful.

Mr. Dedrick, if I understood you correctly, you seemed to be not overly concerned about the likelihood or not expecting the Chinese to be effective competitors with us in third markets in the computer area. And I would like to pursue that with you a little bit. I guess the first question is, do you know what share Legend or all the Chinese PC manufacturers taken together have of the Asian market, not the Chinese market?

Mr. DEDRICK. You mean outside of China? Very little. I think Legend sells in Hong Kong, and that's about it. And the other Chinese PC makers really aren't active.

Commissioner REINSCH. My understanding is it was higher than that. I guess I'll have to do some more research.

Mr. DEDRICK. Well, if you get the IDC data, they'll say Legend is the No. 1—

Commissioner REINSCH. Get the what?

Mr. DEDRICK. International Data Corp. puts out the PC market share data, and they'll say that Legend is the No. 1 PC seller in the Asia-Pacific region outside Japan, but virtually all their sales come in China.

Commissioner REINSCH. And you think the obstacles to them expanding their market share—forget about the United States for the moment—the obstacles to them expanding their market share in Asia, Southeast Asia, for example, are what?

Mr. DEDRICK. They could expand their market in Southeast Asia. Southeast Asia is a small market. If you take all of the ASEAN countries, that's a smaller market than China. China is 12 million PCs in one year. Now, ASEAN is not close to that.

So even if China were to compete effectively in, say, ASEAN, it wouldn't change the global competitiveness of the PC industry very much, but it may be a stepping-stone.

When I said at the end that things change, Legend is not competing now. They may not be competing in the U.S. for a while, but I'm not saying that this can't happen down the line. PCs are a commodity product. Anybody can make them.

You can develop the distribution capabilities and branding, which is not easy, but it's certainly doable. Other companies from other countries have done that here in the U.S. Samsung is a great example.

Commissioner REINSCH. Exactly. That's sort of where I was going. People that I talk to in my little corner of the world think this is going to be a big issue as early as two or three years from now in the United States.

Mr. DEDRICK. I don't think in PCs it's going to be.

Commissioner REINSCH. Well, we'll come back in two or three years, and we'll see who was right.

Mr. DEDRICK. Okay. Fair enough.

Commissioner REINSCH. Thank you, Mr. Chairman.

Co-Chair ELLSWORTH. Thank you, Commissioner Reinsch.
Commissioner Wortzel.

Commissioner WORTZEL. Dr. Berman, I wanted to ask you one question. If you were to look for a place for national leadership in this area, which you've called for, would it be in the office of the science advisor to the President? Would it be in the National Science Foundation? Where should the American people look, bureaucratically, institutionally for that kind of national direction leadership?

Dr. BERMAN. That's an excellent question. You know, I think it depends on what your metric for success is.

If you're looking for leadership in supercomputing as measured by your ranking on the Top 500 list, then I think you want to build the biggest computer you can and you want to look to, say, one of the agencies.; typically DOE is building, the biggest computers in the U.S. And I think you want to look towards making that a priority.

If your metric of success is that you want to win a Nobel Prize in chemistry or physics or something else, technology is the enabler there, and I think you want to put your money in a different place.

For most of us, you know, this is a knee-in-the-curve kind of question, and there's a variety of things you want to do to achieve science and technology leadership. What we don't have today, I think, is really sufficient resources and sustained programs. So many of the programs are short term with short-term deliverables, and you're really doing things that are relatively small. And the other thing that you don't have is coordination. So the agencies shouldn't be doing exactly the same thing. There should be some kind of handshaking agreement about, I'll build the biggest computers and you'll handle the open academic community, for example. Or you'll handle the things that will enable Nobel prizes or whatever your metric for success is. And that we don't see very much.

The agencies have some integration, minimal coordination, at best. And the scientific community, I think, suffers and thrashes as a result of that.

Commissioner WORTZEL. Thank you.

Co-Chair ELLSWORTH. Thank you, Dr. Berman.

Thank you, Dr. May.

Thank you, Mr. Dedrick.

And thank you, Mr. Bold. And thank you, Commissioners. We have a promise given this morning for some open mike time.

Could you come forward and get one of the mikes from the table here and ask a question or make a comment or a small, very small speech. Time limit. Yes, time limit. I'll bang the gavel after you've spoken for 60 seconds.

Vice Chairman D'AMATO. Don't be shy, you students out there.

Co-Chair ELLSWORTH. Don't be shy. 60 seconds each.

Okay. There's a mike that's being liberated from its rack.

OPEN MICROPHONE FOR PUBLIC COMMENT

And, sir, would you identify yourself and your institution.

Larry PRIOR. My name is Larry Prior, and I'm with a high-tech company here in San Diego called Light Point Communications. And we build optical wireless systems. So we connect buildings at high bandwidth.

And I really appreciate you coming and spending time in California and San Diego. And I had watched a little bit of what you had to go through in South Carolina. And you have just a huge dilemma that most of our economy here in California, and especially here in San Diego, is really built on an investment in high-tech R&D. And for years we've outsourced touch labor. We did it in Mexico. We've done it in Eastern Europe, and, yes, we're moving things to Asia now.

And for us to sustain growth here and grow jobs, we're really dependent on that outsource manufacturing. We have been doing it for decades. In contrast, when I see what's happening in South Carolina, they're going through what we experienced back in about 1989, 1992. So I think the challenge is, how do you reconcile an economy as large as California's, which is about the size of China's, where we really are critically dependent on riding that growth in Asia, growing jobs in California?

My company, I've raised \$70 million since 2000 and grown a company from four employees, you know, to 40. And I'm not alone in San Diego. How do you reconcile sustaining that while you're still wrestling with the dilemma of the impacts elsewhere in the world? So I just wanted to thank you for spending time to get the California viewpoint, what we struggle with here in San Diego. We're growing like crazy. We're dependent on the Asian market, and we are growing jobs.

Co-Chair ELLSWORTH. And isn't it the case that here in San Diego we're flooded all the time with workers from Asia, from Mexico and from all over the world. People coming in, brainy people, strong-armed people.

Larry PRIOR. If you walk into my facility, it looks like the United Nations, as does San Diego. We're rich in diversity. We really have fun with it. So it's very different from what you'll see on the East Coast. What is fun, though, is we're growing jobs, and so the model's working for us. How you sustain that through K through 12th grade education, how you help transition a work force from touch labor to management of outsourced workers somewhere overseas is very difficult. The other thing you should start getting ready for—and the question about Legend computers was a great one. They're all coming here now.

If you think of the evolution of the car industry where you start to see BMW opening plants in the United States, you're going to see Chinese manufacturers opening large facilities here in the United States, hiring U.S. workers.

Co-Chair ELLSWORTH. Of course, BMW also makes BMWs in South Carolina where they call it Bubba Makes Wheels.

Mr. PRIOR. So anyway, it's—

Co-Chair ELLSWORTH. Thank you very much. Tell us your name again.

Larry PRIOR. It's Larry Prior.

Co-Chair ELLSWORTH. How do you spell it?

Larry PRIOR. P-r-i-o-r.

Vice Chairman D'AMATO. Let me just say Mr. Prior is a bit of a ringer in a sense because Mr. Prior was on the House Intelligence Committee staff and knows a lot about this whole business.

Chairman ROBINSON. Just a quick comment, though. I think that it is going to have to be a sector-by-sector approach at some level. You pointed out profound differences between South Carolina's experience and that of San Diego and California more broadly. And it is a tough challenge because this is not a one remedy suits all. It's going to have to be broken down into sectors and at times regions. And, because the experience across this country is so different vis-à-vis China—it is—

Larry PRIOR. It's all the appointments from Nancy Pelosi. And we're constantly throwing jobs in her district and doing business in Latin America and across Asia. So it's a huge dilemma.

Chairman ROBINSON. Well, thank you very much.

Co-Chair ELLSWORTH. Anybody else for an open mike?

If not, Mr. Chairman, it's yours to adjourn or as you wish.

Chairman ROBINSON. Well, thank you very much, Mr. Cochairman.

Well, we've had an extraordinary day. And, fortunately, it's not over. We're going to be reconvening at 8:30 tomorrow in this lovely facility for China's role in Asia where we'll hear from Professor Shirk and Ellis Krauss and David Lampton.

And we'll get that all-important geopolitical perspective into the mix, as well. And I would only say that it's been a very rich day. I'm sure all of my fellow Commissioners would agree. We're most grateful to all the panelists and organizers.

And we will look forward to seeing all of you who can attend tomorrow morning. And I would like to adjourn the session at this time. Thank you.

(The proceedings were adjourned.)

FRIDAY, FEBRUARY 13, 2004

OPENING REMARKS OF CHAIRMAN ROGER W. ROBINSON, JR.

Chairman ROBINSON. All right. We'd like to bring to order our morning session, China's role in Asia, an integral piece of the complex series of issues at play and what were extraordinary opportunity to hear from the community in this part of the world yesterday. And we're privileged to have a truly visionary and strong panel with us this morning. And I would like to welcome you all first and thank you, again, for being with us.

With that, I think that if you're willing, we'd like to proceed right into our program and hear from Dr. Shirk first, Professor of Political Science at the Graduate School of International Relations and Pacific Studies at the University of California, San Diego, as all of you know, and one of our hosts for this very special field investigation opportunity on behalf of the U.S.-China Economic and Security Review Commission. We thank you again for that. And we'd like you to proceed.

As far as ground rules, I believe we'll go with a slightly expanded version this morning of a ten-minute presentation and five or six minutes per Commissioner if that's acceptable. And we will proceed at this time.

PANEL I: CHINA'S ROLE IN ASIA

**STATEMENT OF SUSAN L. SHIRK, Ph.D.,
PROFESSOR OF POLITICAL SCIENCE
GRADUATE SCHOOL OF INTERNATIONAL RELATIONS AND
PACIFIC STUDIES
UNIVERSITY OF CALIFORNIA, SAN DIEGO**

Dr. SHIRK. It's a great pleasure to welcome the Commission here to the Graduate School of International Relations and Pacific Studies. This morning we are shifting gears a bit and not talking so much about China's relationship with the world and the United States as a technology power, but looking more at China's regional policies and its relations with its neighbors in the Asia-Pacific.

All of us will be talking about that from different angles. My focus is China's policies toward multilateral organizations in the Asia-Pacific. This is really one piece of what has proven to be, I would say, a very successful approach to regional policy that China has undertaken over the past decade or so.

Let's remember that at the beginning of the 1990s, China didn't—Asia didn't—really have much in the way of multilateral organizations. The contrast was with Europe, of course. And after the end of the Cold War there was a question of whether or not it would make sense to build up some of those regional institutions. And one of the major rationales on the part of the United States and other Asian countries for building up those kinds of institutions was to try to enmesh China in a web of institutional relationships that might help transform China into a responsible country as it grew in power and also to restrain China's behavior, much as the global and Western European institutions have done for all the countries that belong to them.

So this was the idea of, as Jim Shinn at the Council on Foreign Relations put it, weaving the net, trying to integrate China into these international organizations.

And the message I bring this morning is that this approach has worked better than we could have imagined 10 or 12 years ago, that it has worked very well. It's worked very well in the sense that China has really transformed its own attitudes toward working in these multilateral organizations.

In the early and mid '90s, China was very suspicious of these regional organizations. China loved the UN because it was a permanent member of the Security Council and it loved its status and influence there, but it was very suspicious of regional organizations because it worried that as the largest country in the region and as a communist country, that everyone would gang up on China and blame China for one thing or another.

But what happened is that largely through participation in these organizations and including not just the formal organizations, like the ASEAN Regional Forum or APEC, but also Track 2 processes, like the one that we have been organizing here at UCSD since 1993.

And the one I'm referring to is the Northeast Asia Cooperation Dialogue, which is a Track 2 forum, meaning it's not official; it's unofficial. But it includes policy-level officials from foreign ministries, even militaries and defense, as well as two academics, five people from each of the six countries of Northeast Asia. And, of

course, we include ourselves there. So it's the United States, Russia, China, Japan, North Korea and South Korea.

And what I've seen in my involvement in NEACD is that the Chinese have transformed their views so they are no longer suspicious.

In fact, they are very enthusiastic. They are very comfortable. They believe that participation in these kinds of multilateral processes is very useful for them because it helps them reassure their neighbors and the United States that their intentions are peaceful. And, you know, China can talk till they're blue in the face—or Chinese diplomats can—about how they are not a threat to anyone, but the question is, is that a credible commitment or not? And by participating in organizations, especially multilateral organizations that actually have some teeth, they do reassure people that that is a serious commitment to be a peaceful power.

My written testimony describes the organizations, the ASEAN Regional Forum, APEC—the Asia-Pacific Economic Cooperation Forum—ASEAN Plus Three, and the Shanghai Cooperation Organization.

So I'm happy to discuss any of those, but I'm not going to take the time to discuss them in detail in my oral remarks.

What's interesting is that the Shanghai Cooperation Organization was founded by China. China's become such a born-again regional multilateralist that it wanted to have its own organization.

That's the one with the Central Asian republics and Russia designed primarily to try to reduce the threat of terrorists, or what they call terrorists, separatists and extremists, which from China's perspective, they're all the same. But what's interesting is that China's leadership of the Shanghai Cooperation Organization,—especially because Jiang Zemin himself was so enthusiastic about it—has helped legitimate the whole notion of multilateral cooperation within China's domestic policy process.

So, for example, once it agreed to joint exercises in the Shanghai Cooperation

Organization, joint military multilateral exercises, then the PLA and the Foreign Ministry was able to move forward to actually have Chinese military folks observing and eventually participating in multilateral exercises led by the U.S. Pacific Command.

So the Shanghai Cooperation Organization was a good way of moving forward China's regional multilateral diplomacy.

Now, there's debate about what is the significance of China's multilateral diplomacy and why are they doing it? Some people say this is really socialization, that they have really acquired new cooperative values through these multilateral organizations. Other people say, no, it's just a very instrumental strategy designed to enhance China's influence and eventually to subvert the U.S.-centered bilateral alliance structure. In my view, it's not an either/or situation. Basically, I think that China really has come to believe that a collective security arrangement in Asia is preferable to the U.S.-centered alliance structure, that the values of cooperative security are superior to the values of a Cold War alliance structure based on the idea that two countries are cooperating against a common threat.

But on the other hand, it's certainly true that they have real political objectives here. So how should the U.S. respond? First of all, it seems to me that the United States should not turn this into a contest between cooperative multilateral security and the bilateral alliance structure. If we do it that way, we're definitely going to lose because from the standpoint of other Asian countries, those bilateral alliances will not really meet their security needs in the way that multilateral institutions can. Secondly, the United States should invest more time and energy in our own multilateral diplomacy in the region.

I can tell you from my own experience in the East Asia Bureau of the State Department that the multilateral piece always comes last. It's an afterthought. And it's very hard to get people out to the region to participate in these meetings.

If we're going to have a true Pacific community of the sort that Peter Cowhey envisioned for us yesterday, it means working with our partners in the region to develop these multilateral institutions.

And, finally, we need to get out there more.

You know, the U.S. official who has the greatest presence in Asia is the CINC because he's in Hawaii and he's traveling in the region all the time. The tyranny of distance is really a problem. People in Washington can get on an airplane and go to Europe for a meeting and be home in time to sleep in their own bed. But to get out to Asia is much more difficult.

I think we ought to think about maybe having a deputy assistant secretary for regional affairs based in Honolulu or something like that, that would give us more of a continuous presence in the region. Not just on the military side, but on the diplomatic side, as well.

And, finally, let me just add, even though it's a little beyond the scope of today's discussion, that the effect of multilateral diplomacy in the Asia-Pacific on China's own views of its own interests and on its behavior is really striking to me. And it suggests that the six-party talks that we've initiated to work on the North Korea problem are really the way to go about it, not to just have the U.S. do this alone. And I think in the future we might want to test the value of this kind of multilateral approach for bringing North Korea out into the world in the same way that we have done with China.

Thank you.

[The statement follows:]

**Prepared Statement of Susan L. Shirk, Ph.D., Professor of Political Science
Graduate School of International Relations and Pacific Studies
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China's Multilateral Diplomacy in the Asia-Pacific

Before 1994, China was highly skeptical about the value of participating in regional multilateral organizations. It preferred to deal with its neighbors and with the major powers on a bilateral basis. China feared that any grouping of Asians would inevitably gang up against it as the largest, most obvious target. China relished its status as a permanent member of the Security Council in the United Nations, but was reluctant to join regional organizations (Johnston, 1990). Over the past decade, however, China has become a born-again regional multilateralist. It has moved from the sidelines to participate actively in all the various regional mul-

tilateral arenas; it has founded new regional organizations on its own; and it has given multilateral cooperation a prominent place in its national security doctrine.

As the organizer of the Northeast Asia Cooperation Dialogue, an unofficial “track-two” forum for government officials, military officers, and scholars from the United States, Russia, China, Japan, South Korea and North Korea to discuss regional security issues, I have experienced first hand this transformation in Chinese attitudes toward multilateral engagement. At the time of the first meeting of NEACD in 1993, it was easier to persuade the North Koreans to come than it was the Chinese; only on the eve of the meeting did the PRC Embassy in Washington D.C. finally agree to send a second secretary to attend. In those early days, the Chinese also vetoed any proposal for study projects or agenda items that might lead NEACD in the direction of greater institutionalization. The young, articulate diplomats from the Asia Department of the PRC Ministry of Foreign Affairs (MFA) who began attending NEACD and various official multilateral fora, however, came to recognize that regional multilateral engagement offered China valuable foreign policy opportunities. This group of officials has led the way in convincing their bureaucratic colleagues and the Chinese leaders that cooperation in multilateral settings helps China reassure others about its intentions and avert hostile reactions to its growing power. Today, China has emerged as the leader of Northeast Asian multilateral cooperation in its hosting of the six-party talks on the North Korean nuclear problem.

While the evidence of China's growing interest in multilateral cooperation with its neighbors is clear, interpreting it is more difficult: What motivates the Chinese embrace of Asia-Pacific regional multilateralism? Is it a credible signal of China's peaceful intentions or a Bismarckian strategy to grow stronger without provoking others to combine against it (Goldstein, 2003)? Is participation in multilateral organizations socializing the Chinese into a genuinely cooperative definition of their national security (Johnston, 2003)? Or are the Chinese simply using multilateral diplomacy to pretend to be cooperative while building up militarily in a quest to supplant the United States as the hegemon of the region?

China's Portfolio of Regional Multilateral Involvements

The ASEAN Regional Forum (ARF)

The ARF, founded in 1994, is the only region-wide security organization in the Asia-Pacific. The ARF is led by the Association of Southeast Asian Nations (ASEAN), not by the major powers in the region, because ASEAN leadership was acceptable to both China and the United States. China's anxieties about joining a regional grouping were eased by having the ASEAN's in charge. The so-called “ASEAN way” is to emphasize informal dialogue and trust-building over formal agreements and concerted action, avoid interference in internal affairs, and operate by consensus so that the most cautious member can set the pace. From China's point of view, these elements of the informal, non-institutionalized character of the organization (even today it has no secretariat) reduced the risk of a coordinated effort to constrain its freedom of action.

As an example of “soft regionalism”, the ARF has been derided, particularly in the United States, as nothing more than a “talk shop.” Yet, its influence on China's foreign policy rhetoric and actions has been substantial. In the beginning, China objected to the establishment of ARF intercessional working groups; but in 1996 it offered to co-chair a group on confidence building methods with the Philippines. After initially opposing the notion of preventative diplomacy to mediate disputes by the ARF Chair or special representatives, China now supports the concept while seeking to carve out the Taiwan issue and its other territorial disputes from it (Johnston, 2003, p 186). China's public statements at the ARF now endorse the concept of “mutual security.” When the South China Sea territorial dispute was raised in the ARF by the Philippines and the United States, China resisted discussing it in that context; yet the discussions spurred it to intensify its bilateral negotiations with other claimants and negotiate a China-ASEAN code of conduct for the contested territory.

The Asia-Pacific Economic Cooperation Forum (APEC)

APEC, an organization with broad membership (Chile, Mexico, Peru, Taiwan and Hong Kong are among the members), was founded in 1989 with American support to promote regional economic cooperation. Its showcase event is the annual meeting of national leaders where now foreign policy as well as economic issues are discussed. APEC's declared objective is free and open trade among its industrialized members by 2010 and developing members by 2020. China has used its participation in APEC, in conjunction with its entry to the World Trade Organization in 2000, to signal its commitment to open markets and free trade; The APEC summit hosted by Shanghai in 2000 was a lavish coming-out party for the Chinese economy. The Americans, Australians, and Japanese have played leading roles in APEC, and

the organization has a small Singapore secretariat. Still APEC operates according to the same informal, consensus-based procedures as the ARF. Despite APEC's value as a forum for leaders to gather annually and for technocrats to exchange best practices, it remains an organization with no ability to enforce agreements. The organization has been split between the Anglo-American economies (Australia, Canada, New Zealand, and the U.S.) that want binding agreements for trade liberalization and many of the Asian economies (China, Malaysia) that resist them. (Stubbs, 2002, p 447) Beijing's lukewarm enthusiasm for the organization is reflected in the fact that after the Asian Financial Crisis, instead of trying to extend APEC's mission to the stabilization of financial markets, China joined with Japan, Korea, and ASEAN to create a new mechanism, the Chiang Mai Initiative, that does not include the United States. China's initiative to establish a free trade agreement with ASEAN as a group on an accelerated time-table contrasts with the slower pace of trade liberalization in the APEC context.

ASEAN Plus Three

The notion of an Asian regional economic grouping that excludes the United States has been controversial from 1990 when it was first proposed by Malaysian Prime Minister Mahathir Mohammad and the United States put pressure on Japan and South Korea to reject it. (At the time China was unenthusiastic because it believed that Japan, as the strongest economy in the region, would dominate the arrangement.) Yet ASEAN remained interested in the idea. When ASEAN was arranging the first Asia-Europe Meeting (ASEM) in 1994, it asked Japan, China, and South Korea to join it on the Asian side. Planning meetings brought the group together during 1996 and 1997. And the first leaders meeting of ASEAN plus Three was held at the margin of the ASEAN summit in 1997. The growth of intra-regional economic ties and of an Asian regional identify, as well as an easing of Washington's opposition, were responsible for the emergence of the grouping.

Just as representatives from the ASEAN plus Three governments were beginning to meet, the Asian Financial Crisis plunged the region into recession and galvanized the establishment of the grouping. China enhanced its reputation in the region by not devaluing its currency and contributing to the International Monetary Fund package for Thailand. The Asian countries were dissatisfied with the response of the IMF and the United States to the crisis. The United States quashed the Japanese proposal of an Asian Monetary Fund. Refusing to be dissuaded, the Asian finance ministers met at the margin of the Asia Development Bank meeting in Chiang Mai, Thailand, in 2000, and agreed to establish bilateral currency swap agreements (tied to IMF conditions, in order to satisfy the U.S.), an early warning system on short-term capital movements, and a common position on the international financial architecture. Subsequent meetings of economic ministers have created a number of additional practically-oriented cooperative projects. As the rising economic power in the region, China has used ASEAN plus Three to enhance its influence. It has encouraged the expansion of the group's agenda beyond economic issues to the point where the organization appears likely to eclipse the ineffectual ARF and APEC. In addition to annual leaders meetings, the ministers of finance, economics, and foreign affairs also meet regularly. China proposed a ministerial meeting on cooperation to combat terrorism and transnational crime that was held in January 2004. Well-aware of the risk that ASEAN plus Three could come to be viewed as an effort to marginalize the United States, China recently has recalibrated by proposing to beef-up the security dimension of the ARF by holding an annual security policy conference for defense officials.

A crucial element in the success of ASEAN plus Three is that China has used it to try to mend relations with Japan. Previously China sought to limit Japan's regional profile by refusing to engage it in discussions on security and political issues; a 1997–8 Japanese-American proposal to build confidence by holding three-way talks with China was rejected by China. (A senior Chinese Foreign Ministry official explained privately to me that it was because Japan "wasn't a real power like the United States and China.") China began consultations with Japan and Korea in the context of ASEAN plus Three insisting that they be limited to economic topics, but over time it has taken the lead in expanding the agenda to political and security issues.

The Shanghai Cooperation Organization (SCO)

In 1996, China joined with Russia to found the SCO (originally called the "Shanghai Five") whose members now include, along with the two powers, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. The organization grew out of the lengthy negotiations between China, the Soviet Union, and the Central Asian Soviet republics to resolve their borders. When these republics became independent countries,

China sought to make the grouping permanent. Its main goal is to gain the cooperation of these new governments to reduce the threat of Muslim separatism in its Western provinces. The charter of the SCO, signed by President Jiang Zemin and his counterparts in 1996, pledges that all its members will cooperate to combat "terrorism, separatism, and extremism" which in Chinese eyes are more or less synonymous. The charter also contains agreements for specific confidence-building measures similar to that of the Conference on Security and Cooperation in Europe. (Johnston, 1993, p 128)

China is extremely proud of the SCO, the first international multilateral organization it has founded itself. As a "home-grown" organization, the SCO has helped build domestic support within China for multilateral diplomacy. For example, the SCO charter signed by President Jiang envisioned joint exercises, something China had never before agreed to. (The first SCO exercises were held in 2003.) The pro-multilateralists in the Asia Department of the Foreign Ministry and the PLA used the SCO precedent to get internal agreement on China's participation in joint military exercises with other countries, including the United States. China also first embraced the concept of mutual security (see below) in the context of the SCO, and having taken "ownership" of it in this way, promoted it as a positive precedent for the rest of the Asia-Pacific. With China's backing, the SCO is becoming more institutionalized than other regional multilateral organizations, with a secretariat in Shanghai and a counter-terrorism center in Bishtek.

In addition to these organized multilateral activities, China has also initiated free trade diplomacy with ASEAN and with Japan and South Korea to signal that it is a benevolent regional power. Having been required to open its domestic market much wider than many of its neighbors as the price of its entry to the World Trade Organization, it is relatively inexpensive for China to move toward free trade in many products and services with these neighbors.

Another positive signal is China's new willingness to join multilateral military activities including those led by the United States and its allies. The People's Liberation Army has sent observers to the large exercise known as Cobra Gold in Thailand, as well as to joint submarine rescue and mine-sweeping exercises. Beijing's only limitation is that the exercise must involve a non-traditional (i.e. non-combat) mission. Eventually, as its skills and equipment are upgraded, the PLA intends to go beyond observing to actually participating in multilateral military exercises. It has already held bilateral joint exercises and has invited groups of countries to observe its own exercises. It even has proposed joint military exercises with the United States.

A New Security Concept

Beginning in the mid-1990's, Chinese scholars, encouraged by the Asia Department of the Ministry of Foreign Affairs, began to develop a theoretical rationale for China's multilateral diplomacy. They articulated a "new security concept" based on mutual security and contrasted it with traditional and cold war security concepts based on realpolitik. The key element of the new concept is the notion of "win-win" positive sum security, meaning that a country is more secure if its neighbors also feel secure. A report commissioned by the MFA on this concept acknowledged that in addition to China's rise its actions on the ground also were causing other states to perceive a threat from China; China needed to demonstrate to its neighbors that it adhered to the existing rules of the international order. Greater activism in multilateral activities would signify that it was a status-quo power (Johnston, 2003, p 130). The new security concept was incorporated in the 1998 PRC White Paper on National Defense.

Guided by this new security concept, China's multilateral diplomacy is no longer reactive and defensive. In the early 1990's China joined regional groupings created by others only because it did not want to be left out. After ten years of experience in such groupings, China now has an affirmative commitment to multilateral co-operation in the region and confidently takes its own initiatives to strengthen it.

Motivations for Multilateral Diplomacy

Foreign observers largely agree that China's primary motivation for its participation in regional multilateral processes is to reassure its neighbors and the United States about its benign intentions. China recognizes that its growing economic and military capabilities create perceptions of a "China threat." Over time, it has also come to realize that simply denying that it has any aggressive intent is unpersuasive. Its statements of non-aggressive intent are made more credible by its cooperative actions. By joining multilateral organizations and taking multilateral initiatives China builds a reputation as a "responsible power" and heads off hostile reactions to its growing might.

Observers differ, however, as to whether China's multilateral diplomacy is a carefully cultivated effort to advance national interests by "reassuring those who might collaborate against a putative China threat" (Goldstein, 2003, p 73), or a genuine conversion to mutual security values inculcated by the experience of participating in multilateral processes (Johnston, p 132). It is difficult to find empirical evidence to distinguish the two interpretations, and indeed, both may be occurring simultaneously.

For example, China may promote multilateral security cooperation in Asia for a number of instrumental reasons: not only as a mechanism for reassuring its neighbors, but also eventually to replace the U.S.-centered system of bilateral alliances with a cooperative security architecture in which it plays a leading role. (Western Europe was similarly motivated to integrate Eastern Europe into the CSCE as a way of attenuating Soviet influence in the region.) Yet China's foreign policy officials and members of the unofficial policy elite may believe sincerely that the values embedded in multilateral cooperation are superior to the values embedded in the U.S. bilateral alliances that originated during the Cold War. Realpolitickal pursuit of national interest does not preclude an idealist commitment to the values of multilateralism.

Consequences of Multilateral Diplomacy

When the United States was a rising power after World War II, it was able to convince other countries that it would not threaten them by creating multilateral global institutions and submitting itself to the authority of these institutions. By binding itself to international rules and regimes, the United States successfully established a hegemonic order (Ikenberry, 2001) Could China's participation in global and regional multilateral institutions have the same result, enabling China to rise to power without provoking a concerted effort to contain it?

Some of the global regimes that China has committed to, in particular the Non-Proliferation Treaty, the Comprehensive Test Ban Treaty, and the World Trade Organization, embody specific rules and mechanisms for enforcing them. These regimes effectively restrain Chinese behavior and build international confidence that in some important respects, a strong China will not harm the interests of other countries.

The multilateral processes established in the Asia-Pacific region, in comparison, have much less binding force. Organizations like ARF, APEC, and ASEAN plus Three aim to use dialogue to create a normative influence on the actions of their members, but they have not yet established either specific rules or the mechanisms to enforce them. If China's multilateral diplomacy turns out to be "cheap talk" designed to lull others into believing that its rise is non-threatening until it has the capability to achieve its territorial objectives and dominate its neighbor, ARF, APEC, and ASEAN plus Three have no mechanisms to restrain it.. From the standpoint of China's neighbors, the country's activism in multilateral settings is a reassuring signal but not a guarantee of non-aggressive actions. Interestingly, the SCO, the one regional multilateral organization that China has founded itself, has the most specific rules and is moving in the direction of greater institutionalization. This fact suggests that after a decade of experience with multilateral diplomacy, China might not object if other Asian countries now sought to protect themselves by making regional organizations more institutionalized and rule-bound. While proposals to give regional organizations more teeth are likely to gain more traction if they are proposed by Asian governments and not by the U.S. government, the U.S. would gain by supporting them even if they mean restricting its own autonomy.

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Chinese Participation in Regional Multilateral Activities



Chairman ROBINSON. Well, thank you very much, Dr. Shirk. That was a fascinating set of remarks.

Dr. Ellis Krauss is going to be up next, who is professor of political science at the Graduate School of International Relations and Pacific Studies at the University of California, San Diego.

We look forward to your remarks.

**STATEMENT OF ELLIS S. KRAUSS, PH.D.
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Dr. KRAUSS. Thank you. Thank you for having me.

My talk today, as those of you have read in my written remarks know, is about Chinese-Japanese relations. And to a large extent I think these are going to influence the U.S.-China relationship to a much greater extent than most people realize and especially since there have been profound changes in that relationship during the last ten years that have gone very unnoticed in the United States. As T.J. Pempel and I in a recent book argue, it is very difficult these days to find an issue between the U.S. and Japan that does not in some way actually or potentially involve China. In many ways the relationship has become somewhat trilateral, rather than bilateral. And yet we continue to focus a lot of our attention on the bilateral U.S.-Japan relationship.

The changes that have occurred in the Chinese-Japan relationship are going to shape and create dilemmas and challenges for American policy in the future, I believe. These changes have come about in part because of China's growing economic and security in-

fluence in the region and power, and in response, Japan's reaffirmation of the U.S.-Japan security treaty and moving ever closer to the United States militarily. Both of these have provoked shifts or been manifested as shifts in Japanese public opinion toward China, in the Japanese political elites' attitudes and behavior toward China and China's, therefore, response to these, developing new concerns in China.

I think there are four important dimensions to the China-Japanese relationship, both historically and at present.

The first is the one that we don't talk about much in the U.S., but it's the historical memories aspect. And that is, the continued deep distrust and fear that many in China have toward Japan because of its behavior during the Pacific War. Not many Americans know that China suffered 13 million deaths, civilian, during the Japanese aggression in China. As some have pointed out, this is more than the Nazis caused in Europe.

And in contrast to Germany, which has forgiven and accepted as a valued member of the European community, in part, because of the much earlier development of multilateral organizations there, these feelings in China toward Japan have remained quite strong.

A public opinion survey, as I point out in my report in 2000, showed that only 5 percent of them saw Japan as reliable, less than 10 percent saw Japan as peaceful, only 16 percent saw Japan as Democratic, yet 44 percent saw them as headstrong, 27 percent still saw them as aggressive. This is despite 60 years of peaceful behavior on the part of Japan. And for most of the post-war period, the Japanese government has been very sensitive to the feelings of Chinese on this score. And the Chinese, in turn, have tried to use the so-called history card against the Japanese as leverage in negotiations.

However, there have been profound changes in this regard in Japan. The Japanese public, according to public opinion surveys, has had a increasingly negative view of China ever since the Tiananmen Square incident in 1989, and it has not gone back up since. It had a very positive view before that. And the Japanese government is taking in a much more nationalistic line on the history issue, to a large extent growing impatient with the Chinese use of this issue in negotiations and rejecting—increasingly showing impatience toward the Chinese on this issue. The second dimension would be the economic integration dimension. It is no exaggeration to say that the Japanese have always believed that the best way to open up China and liberalize it is a long-term strategy of economic development in China. They have not put as much faith in socialization or military deterrence as the United States.

Trade with China has started before it did with the United States and has risen to extremely high levels. \$85 billion in 2001, as you probably know.

You may not know that Japan is running a heavy trade deficit with China of about \$27 billion of that.

Foreign direct investment in China by Japan is not as high as the United States or Taiwan or Hong Kong, for example, but it's very difficult to measure that because many of the business concerns in Hong Kong and Taiwan, for example, are Japanese and thus there is also indirect FDI.

China is Japan's second-largest target of foreign aid—10 percent of Japan's total foreign aid in the world goes to China. And during the Cold War Japanese policymakers were very sanguine about their ability to manage and handle China because of their economic relationship and presumed blood and cultural ties.

This has now changed for various reasons. China is increasingly seen not as an opportunity, but as a threat economically.

Briefly, the reasons are, China's increasing manufacturing proficiency, which is attaining Japanese levels, and thus making China a potential competitor to Japan; the hollowing out of Japanese domestic industry, including many small and medium enterprises that are now manufacturing in China; trade issues, textiles, but especially the agricultural trade war in December 2001. And Japanese taxpayers are now questioning why their government gives so much foreign aid to China when it is no longer really a developing nation, but, rather, a competitor.

The third dimension, and maybe the most important, is the U.S.-Japan relationship and security in which China had a rather ambivalent attitude toward the US-Japan Mutual Security Treaty, at least to some extent since 1972; however, it seems to have considered the U.S.-Japan security treaty, in part, a "cork in the bottle," in that famous phrase. It had potential utility in restraining Japan from becoming an independent military power again and restraining Japanese nationalism. Recently, however, with Japan becoming much closer to the U.S. militarily, including strengthening our alliance and cooperating on theater missile defense, some in China have started to see, much more strongly, I believe, the U.S.-Japan alliance as an eggshell, rather than a cork in the bottle. An eggshell meaning it is covering and hiding the nurturance behind the scenes of a monster that is going to hatch, namely, Japanese militarism again. And Japan is a military power.

At the same time, Japan has become very dependent on China in issues like the North Korean nuclear issue in which China is playing a major role as a mediator.

And also, Japan's abduction issue, which doesn't get much play in the U.S., but which, in fact, is an obsession of the Japanese public. North Korean agents, as you may know, kidnapped several Japanese citizens since the 1970s. Some have been returned. But their children are still in North Korea, and the Japanese government and public and media are fascinated by and obsessed about getting these people back. The fourth dimension is the territorial disputes, and, of course, the most important being Taiwan, although there are others. I don't go into it much in my paper, but there are conflicts, territorial conflicts between China and Japan over the East China Sea and the South China Sea. But the most important one, of course, is Taiwan. In 1969 the Sato-Nixon communiqué seemed to imply that the security treaty applied to Taiwan. But China didn't make a big issue of it after that and neither did Japan, and the issue lay dormant.

However, in the new guidelines surrounding the implementation of the security treaty between—the revision of the security treaty guidelines between the U.S. and Japan, the phrase "defense co-operation in areas surrounding Japan appeared," "shuhen" in Japanese.

The Chinese are very concerned, I believe, that this means that the security treaty now can be applied to Taiwan. Japan's response to this issue has been to keep the meaning of that phrase intentionally vague. It has said that areas surrounding Japan is not a geographic designation, but, rather, one that will be decided depending on the extent to which and how—and the circumstances threaten Japanese security.

In other words, what the Japanese are doing are not encouraging China to take over Taiwan by saying clearly that this treaty does not apply to Taiwan, but neither, on the other hand, is it going to reassure—it is going to keep its options open that it might apply to Taiwan in order to deter Chinese aggressive behavior toward Taiwan.

Combined with theater missile defense's potential application to the defense of Taiwan, these are of increasing concern to the Chinese government.

I have, like, ten seconds left. So let me just say that there are a lot of ironies in this situation, which I point out in my paper, the current changes. And there are also many dilemmas that the United States are going to face as a result of these changes in Chinese-Japanese relations.

Thank you.

The statement follows:]

**Prepared Statement of Ellis S. Krauss, Professor
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China's role in Asia

Much attention in the U.S. and elsewhere is being focused on the rise of China as an economic, military, and political 'player' in Asia and its implications for the United States. It would be a mistake, however, to see the U.S.-China relationship in a 'cocoon' separated from the broader relationships and trends in the Asia-Pacific region. For better or worse, China's relationships with its Asian neighbors are going to deeply concern, implicate, and involve the U.S.—they have inevitable consequences for U.S.-China relations and American foreign policy toward China and the region.

None of China's neighbors is as crucial to the U.S. and to the region as Japan, and no other relationship of China's, other than that with the U.S., is as important to China as that with Japan. As T.J. Pempel and I argue in a recent book:

Even though the U.S. and Japan are as close as ever economically, and perhaps even closer militarily, each must now consider the other's actual and potential relationship with China on almost every issue arising between them. No longer can the other's exclusive vested interest in, and likely agreement with, their long-time partner be taken for granted and presumed to take primacy across Asia.¹

China-Japan relations increasingly will be a major influence on and shaper of relations between China and the U.S. and of relations between Japan and the U.S. Indeed, it is not much of an exaggeration to say that in the current post-Cold War Asia Pacific, the U.S., China, and Japan, relations are today about as much trilateral as bilateral. Therefore, it is essential to understand the areas of conflict and cooperation in China-Japan relations to fully comprehend issues in China-U.S. relations, and to understand fully the dilemmas and challenges the U.S. confronts in its future relations with China.

¹Ellis S. Krauss and T.J. Pempel, eds., *Beyond Bilateralism: U.S.-Japan Relations in the New Asia-Pacific*. (Stanford: Stanford University Press, 2003), p. 307.

Background: 1945 to mid-1990s

The China-Japan relationship in the postwar era has tended to revolve around four issue dimensions: 1) "historical memories" 2) economic interdependence 3) the U.S.-Japan relationship and security 4) Territorial issues, especially Taiwan.

1) "Historical Memories": To fully understand China's relations with its neighbor Japan it is necessary to comprehend the deep and abiding antipathy, distrust, and fear that many Chinese feel toward Japan because of its behavior in the Pacific War. Although the exact numbers will never be known for sure, estimates are that China suffered over 1.3 million military deaths and perhaps as many as 13 million civilian deaths as a result of Japan's invasion of China in 1937 and the subsequent eight-year war that only ended with Japan's surrender to the U.S. in 1945. The extent and number of atrocities on civilians committed during this war also remains both unnumbered and numberless. In "The Rape of Nanjing," in December 1937, perhaps as many as 300,000 civilians lost their lives in several days of rampage, brutality, rape, and murder by uncontrolled Japanese troops. About 10,000 Chinese as well as Russian, Korean, and Mongolian civilians were used as guinea pigs, infected with plague, cholera and anthrax bacteria in biological weapons experiments by the infamous Unit 731 near Harbin. Millions lost loved-ones, homes, relatives, and due to Japan's aggression.

It is not surprising that this period is remembered with bitterness by many Chinese. What is surprising is that even after nearly 60 years, these memories have been, and still are, used as a yardstick by many among the public to judge postwar Japan, a nation that has been transformed into a peaceful, democratic nation with a "Peace Constitution" and no offensive military or combat operations since then. In a 2000 public opinion survey of adults concerning images of the other country, although about a majority or more of Chinese saw Japan "prosperous" as a country and its people "diligent" and "courteous," only 9% saw the country as "peaceful" and 16% "democratic," and only 6% saw its people as "peaceful," 5% as reliable, even while 44% saw them as "headstrong," and 27% saw them as "aggressive."² China's government also has played the 'history card' often in its dealings with Japan and used it as a lever to extract concessions from the Japanese side.

Such continuing Chinese fears and uses of the "history card" must be seen in broader comparative context. In Europe multilateral institutions like NATO and the EC (Later EU) were formed and enmeshed Germany into a community of nations which would preclude any independent future military expansion on its part (many believe these institutions were, at least in part, designed intentionally for this purpose, whatever other goals they had). Increasingly, Germany's neighbors were reassured that the past could never be repeated. Japan was not embedded in such multilateral frameworks after WWII., and Japan's neighbors, especially China and Korea, never came to be completely reassured about Japan's future potential as an aggressor, despite its "Peace Constitution," its democratic government, and its non-threatening behavior. Indeed, the one reassurance of an external restraint on Japan might be the U.S.-Japan alliance and the possibility that the U.S. provision of security to Japan would serve as a constraining influence on any future independent and unrestrained Japanese militarism.

2) Economic Interdependence: Even while the Chinese public has held these continuing negative and fearful attitudes toward Japan and the Japanese, and the Chinese government was using historical memories as a bargaining lever with Japan, trade with Japan and Japanese investment in China was proceeding apace. Even before normalization of relations between the two countries and the establishment of official diplomatic relations, in the 1950s they were engaged in trade through semi-official channels (although severely restricted by COCOM export controls during the Cold War) and after 1962 through a semi-official, 5-year agreement (L-T Trade, as it was called). Indeed, Japan was the only country in the world at this time to freely trade with both Taiwan and China.³

With the establishment of normal relations in 1972, trade expanded greatly, especially after the Chinese government's more moderate course after the late 1970s. During much of the next two decades, Japan was one of China's largest trading partners, reaching over \$20 billion dollars total per year (with the balance substantially in China's favor) in the early 1990s and by the end of the decade almost \$60

²Yumiko Hara and Takehiro Shioda, "Images of the Other Country and Media Coverage," NHK Broadcast Culture Research Institute, Features No. 12 (Summer 2000), Figure 13; available on the web at <http://www.nhk.or.jp/bunken/bcri-news/bnl-s-feature.html>.

³Reinhard Drifte, *Japan's Security Relations with China since 1980* (London and New York: RoutledgeCurzon, 2003), p. 21.

billion dollars, and over \$85 billion by 2001 (again with Japan running a heavy trade deficit).⁴

Japanese investment in China lagged far behind trade and American investment until the 1990s. It then increased substantially, but fell back a bit during the East Asian economic crisis before reviving again recently. In direct bilateral Foreign Direct Investment (FDI), Japan still lags behind the U.S., Hong Kong, Taiwan, and the Virgin Islands (probably at least in part also an indirect source of Taiwan investment) in FDI to China,⁵ but China is one of Japan's largest targets of FDI today. Because of extensive Japanese investment and manufacturing concerns in Hong Kong, Taiwan and Southeast Asia, many with business dealings with China as well, the actual amount of Japanese FDI, indirect and direct, is probably much higher than the direct bilateral figures indicate.

In 1972 when relations between China and Japan were normalized, part of the agreement was that China would officially disavow any reparations claims from Japan for its aggression during the Pacific War. China did this in the expectation that Japan would consequently be quite generous in giving China Overseas Development Assistance (ODA) after normalization. Their expectations were not disappointed. Since then China has consistently been one of Japan's two or three top targets of ODA. In 2001, for example, it received almost \$700 million dollars (nearly 10% of Japan's total ODA in the world), second only to Indonesia.⁶ Most of this ODA is in the form of loans. Japan has provided a large proportion of all ODA, bilateral and multilateral to China. There has been a strategic intent behind Japan's large ODA to China—the hope that it would encourage the further opening of China to trade and investment and ultimately to a more moderate and open Chinese economic and political system.

3) The U.S.-Japan Relationship and Security: From the Chinese perspective, because of the U.S.-Japan alliance, their security relations with Japan are intimately tied up with the U.S.-Japan and U.S.-China relationship. In the early Cold War period, the Chinese government was quite critical of the U.S.-Japan alliance as threatening China. In the process of normalizing relations with both countries in the early 1970s, however, China shifted its position and clearly signaled to both the U.S. and Japan that it could tolerate their alliance. There were two probably reasons for this. First, the Chinese were more concerned at that time about "balancing" against the former Soviet Union whom they saw as at least as great a threat. Second, at least some in China have always subscribed to the "cork in the bottle" theory of U.S.-Japan relations that this relationship keeps Japan from becoming an independent military power again, and helps to keep Japanese militarism and aggression in check. Chinese attitudes toward the U.S.-Japan security treaty and alliance therefore have always been ambivalent. On the one hand, they recognize the value of the U.S.-Japan alliance for restraining Japanese independent militarism. On the other hand, the Chinese watch Japan's military posture and expenditures carefully for signs of rapid increase portending more independent military might and are critical of American attempts to pressure Japan to increase these. And there are some in China who have seen the alliance as merely shielding quiet but persisting Japanese attempts to regain their independent military position—an "eggshell" within which the monster is being nurtured again, rather than the "cork in the bottle." Thus the attitude of the Chinese government toward the U.S.-Japan relationship has varied over time, and is dependent on Chinese leadership's perception of the behavior of both the U.S. and Japan, and how good their relations are with both.

Meanwhile, although the Japanese and American governments share similar goals for China and have ultimately similar interests there (a stable, peaceful, democratic and ultimately capitalist China open to foreign trade and investment), they have often differed in their views of the best means to achieve these goals and interests. For most of the postwar period until the mid-1990s, the Japanese government was much more sanguine about the threat of China, its steps toward democracy, its human rights record, and its closed economic system than were American leaders. The Japanese public was far more positive toward China, often in the (not very rational) belief that "same blood, same script," i.e., common race and culture, meant that Japanese understood China better than Americans. Secure in the protection of the U.S.-Japan military alliance and with its limited military capability, Jap-

⁴ Ibid, pp. 23 and 135; ASEAN-Japan Centre Web site Table II-2 "Japan, ASEAN, and China's Major Trading Partners (2001), <http://www.asean.or.jp/general/statistics/02trade/02.html>.

⁵ ASEAN-Japan Centre, Table IV-8-10 "Investment to China," at <http://www.asean.or.jp/general/statistics/04investment/08-10.html>.

⁶ Ibid., Table I-10-1 "Types and Geographic Distribution of Aid (2001), <http://www.asean.or.jp/general/statistics/01basic/10-01.html>.

anese government officials believed that the best and most effective way to encourage China to become more open and democratic as well as capitalist was to use economic aid, trade, and investment. They preferred these methods over containment through military power, or overt pressure to remove barriers to foreign trade and investment or to improve China's performance on human rights. Indeed, Japan was one of the last countries to impose economic sanctions on China-and many believe did so only because of U.S. and European pressure-and one of the first to remove them after the Tiananmen incident in 1989.⁷

4) Territorial issues, especially Taiwan: The ultimate issue of conflict in the relations of both Japan and the U.S. with China, of course, is the status of Taiwan. There is no issue more likely to enrage the Chinese people, to provoke the Chinese government, or to tempt China to consider military action, than an attempt to deny Chinese sovereignty over Taiwan, or for Taiwan to assert its independence and be backed in that effort by the U.S. or Japan. Fortunately, neither the Japanese nor the American government wishes this to happen and have supported the "one China" policy. They have further discouraged any movement toward Taiwan asserting its independence, even though there are those in the Japanese political elite, as in the American, who are more supportive of Taiwan than China on this issue.

The key issue here has always been the role of the U.S.-Japan Security Treaty in protecting Taiwan from any attack by China, whatever the provocation. In 1969, the Joint Communiqué between Prime Minister Sato and President Nixon included a phrase that implied that peace and security around Taiwan was essential to Japanese security. It also implied that the security treaty might bring in Japan to defend Taiwan in case of attack by China or at least allow the U.S. to use its Japan bases to repel such an attack. Given the importance of Taiwan and the sea lanes around it to Japanese economic and strategic interests in the region, Japan of course views stability in that area as of importance, but it has always been unclear whether the Japanese public would be willing to risk war with China over Taiwan.

Changing Japan-China Relations: mid-1990s to the Present

Profound changes have occurred since the mid-1990s on each of the dimensions briefly described above. Two trends in particular account for many of the changes now occurring: China's continued growth as an economic and military power in the region and the continuing reaffirmation of the U.S.-Japan alliance and Japan drawing closer to the U.S. on security matters. These have both stimulated and been manifested in shifts in public and elite opinion and Japanese policy toward China, and changing Chinese behavior toward Japan. As many of the older concerns have faded, new and potentially dangerous ones have replaced them.

1) Recent Changes—Public Attitudes and Historical Memories: Increasingly, the Japanese public has turned more ambivalent about China. In the preceding period, it was far more sanguine about its ability to manage and handle its relationship with China and China's potential economic and military threat to it. During the past decade or so it has turned decidedly less confident on this score. The public's favorable attitude toward China dropped precipitously after the Tiananmen Square incident in 1989 (see Figure in the Appendix). Even after the Japanese government reinstated aid to China after the incident and time has diminished the impact of the Tiananmen events, public attitudes never recovered because of a continuing series of events and incidents that have been received negatively by Japanese. Among these events were China's continuing nuclear weapons tests (1995), the Taiwan Straits Crisis (1996), China's reactions to Japan's increasingly close security relationship with the U.S., an awkward visit by President Jiang Zemin with controversy over the historical memories issue (1998), and territorial disputes over disputed islands in the Pacific. Some of these will be dealt with in more detail below.

In general, the Japanese public, politicians, and officials have become far less patient and deferent toward China over its playing of the "history card" so frequently. New generations are often either partially ignorant of or feel less guilty about the human consequences of Japan's aggression in China during the Pacific War, and are tired of hearing constantly about their country's crimes in China from the Chinese. Further, there has recently been an influx of Chinese immigrants into Japan. Japan had only about 75,000 Chinese registered foreign residents in 1985. By 2001 those numbers had grown five-fold to 381,000.⁸ The Japanese police and media often asso-

⁷ See for example, Mike M. Mochizuki, "Terms of Engagement: The U.S.-Japan Alliance and the Rise of China," in Ellis S. KraU.S.s and T.J. Pempel, eds., *Beyond Bilateralism: U.S.-Japan Relations in the New Asia-Pacific*. (Stanford: Stanford University Press, 2003), pp. 96-99.

⁸ ASEAN-Japan Centre Web site, Table I-11 "Number of Foreign Residents Registered in Japan," <http://www.asean.or.jp/general/statistics/01basic/11.html>.

ciate a growing crime rate in Japan with these Chinese foreign residents, and with the activities of Chinese gangs operating in Japan. Many people in Japan today are more likely to be concerned about the social problems, rightly or wrongly that they perceive to be associated with Chinese in their country than by anything their parents or grandparents may have done to China 60-70 years ago. The growing disparity between the Chinese and Japanese publics' views on this issue are shown by the fact that among Chinese the "Discrepancy in awareness of historical facts of the Japanese invasion of China" ranks as the most serious issue in Japan-China relations and the second most important issue remaining to be settled between China and Japan. It ranks, however, as only the third most serious issue and sixth most important issue to be settled among Japanese, with twice or more as many Chinese as Japanese selecting this issue in each case.⁹

Also, Japanese government has taken a more nationalist line toward the issue, in part because of growing right-wing influence and opinion that has never accepted the historical facts of Japan's aggression in China. Even Japanese Cabinet ministers and other prominent politicians have made outrageous statements denying or minimizing Japan's atrocities in China during the war. The contrast with Germany is instructive: whereas in Germany it is illegal for a person to deny the holocaust and it is unthinkable that a German member of the government would do so, the equivalent utterances are regularly made by prominent Japanese politicians. Japanese prime ministers add insult to injury in the eyes of the Chinese by persisting in annual (semi-private; semi-official) visits to Yasukuni Shrine, a Shinto Shrine in Tokyo where the souls of Japan's war dead are enshrined, including, and this is the most controversial part of this issue, the seven war criminals executed by the American Occupation for war crimes. China and South Korea inevitably protest these visits and see the refusal of Japan's leaders' to desist from such behavior as evidence of Japan's continuing and growing nationalism, potential militarism, and unreconstructed lack of guilt for its wartime behavior toward those countries. Although the Foreign Ministry itself is usually embarrassed by these types of incidents and understands how they complicate their foreign relations with China, Japan's foreign policy toward China has also become less deferential and more assertive on the historical issue.

Nothing illustrates this better than the visit of President Jiang Zemin to Japan for a summit meeting with then-Prime Minister Obuchi. Japan had recently provided a written apology to President Kim Daejung of South Korea for its treatment of Korea, and undoubtedly President Jiang was expecting the same. He did not receive that written apology, however, in part because of opposition from conservative elements within the ruling party. In return, he brought up Japanese aggression toward China constantly while in Tokyo, further alienating Japanese elites and public opinion.

A constructive consequence of this unfortunate incident has been that Chinese leaders now seem to recognize that insistence on playing the "history card" at every opportunity has become counterproductive and has diminishing returns. In the last few years, other than protests over Yasukuni visits, one hears less about the wartime memories issues from Chinese officials.

2) Recent Changes—Economic Rivalry: Japanese economic relations with China moves ahead as before, but there has been a subtle shift in perception among Japanese political and economic elites and public about the positive consequences of such deep relations. In the past such relations were seen primarily as an opportunity—for Japanese business as well as to help develop China to become a more open nation politically and economically. They now are increasingly also coming to be seen as a threat.

One reason for this is China's increasing proficiency at exports, both their usual agricultural products but also now machinery and equipment. Indeed, it is said that Japan's Ministry of Economics, Trade, and Industry has sometimes been shocked at the efficiency of China's manufacturing factories, some of which now rival or may even surpass Japan's vaunted manufacturing prowess. Increasingly, although Japanese firms including small and medium enterprise, are now manufacturing more and more of their products in China, among some Japanese there is not only fear of this "hollowing out" Japanese domestic industry production leading to exporting of jobs, but also that China will increasingly become a competitor to Japan as it goes up the ladder to higher and higher value-added manufacturing products. There is a growing feeling among Japanese business and government elites that Japan must run faster to stay ahead of China, unlike in the 1960–1980s when its goal was to

⁹Yumiko Hara and Takehiro Shioda, "Images of the Other Country and Media Coverage," Tables 15 and 17.

"catch up with the West." Ironically, Japan is beginning to experience the same type of competitiveness stimulus that the U.S. did from Japan during the earlier period.

Indeed, Japan and China have experienced their first major issues over textiles and agricultural goods. From 1994 to the present, Japanese textile manufacturers who have lost market share increasingly to Chinese imports, have been trying to get the Japanese government to impose "safeguard" measures on some categories of Chinese textile products. The government thus far has continually postponed doing so. This response has been made easier by the fact that a significant percentage of Japanese companies also import textile goods from China and the Chinese government has been cooperative in trying to voluntarily restrain some exports.

Agriculture, however, has been a different story. Japanese agriculture, as is well-known, is highly protected for political reasons. Rural districts essentially are over-represented in Japan's parliament (the National Diet) and strongly support the ruling Liberal Democratic Party (LDP). It is no exaggeration to say that these malapportioned districts have kept the LDP in power for almost all of the last half-century. In 2001, a full-scale "trade war" broke out over China's increasingly successful expansion exports of categories of vegetables and other agricultural productions. On April 17, 2001, under pressure from the farm lobby, the Japanese government decided to impose provisional safeguard curbs on imports of Welsh onions, shiitake mushrooms and *tatami* (straw mat) rushes. These products were grown in a region where influential LDP politicians in agriculture had their constituencies, and the party was also feeling vulnerable because its prime minister (Mori) was unpopular and an upper house election was approaching. The government at first tried to resolve this by getting the Chinese government to adopt voluntary export restraints, but the latter refused. Japan then imposed "safeguard measures" to limit imports of these products. China immediately retaliated by levying a 100% special duty on imports of Japanese motor vehicles, mobile phones and air conditioners, important and valuable Japanese exports to China.

The crisis was settled in Dec. 2001, when Tokyo agreed not to enforce full scale import curbs on agricultural products from China, and Beijing lifted its retaliatory duties on Japanese products, with both sides agreeing to establish a consultative organ of industry organizations to discuss agricultural product trade. Nevertheless, these two cases are undoubtedly only the opening rounds of continuing trade friction between the two countries in the future, given China's increasing competitiveness in several sectors in which Japanese industry is declining or which are political sensitive, such as agriculture. If current trends continue, we may also expect Chinese industry to begin to challenge Japan in some of its traditionally strong sectors, much as South Korean firms are now doing in semiconductors and electronics. We may also expect each of the two countries to use the WTO to both challenge the other on some issues but also to try to settle their future disputes now that China has become a member.

China's economic growth and actual and potential challenge to Japanese industry in some sectors has also led many Japanese taxpayers to question why their government continues to provide ODA to China as if it were still an undeveloped nation. Political pressure has led the government to begin to scale back some of its assistance to China for the first time in the postwar period.

Finally, Japan and China are becoming increasing rivals for trade with ASEAN and other Asian countries. China proposed a Free Trade Agreement (FTA) with ASEAN that was initially rejected but ultimately accepted with negotiations under way, and Japan has now proposed the same to ASEAN. Singapore has signed an FTA with Japan and has now in the latter part of 2003 proposed the same to China.

Much as with the U.S.-Japan trade friction and competition of the 1980s-1990s, economic integration and interdependence has not prevented Japan and China from also to some extent experiencing trade disputes and economic rivalry.

3) Recent Changes—The U.S.-Japan Relationship and Security: In no dimension has the China-Japan relationship shifted more dramatically, however, than in the area of security. After the U.S.-Japan alliance began to "drift"¹⁰ at the end of the Cold War, policymakers on both sides of the Pacific intervened to "reaffirm" the importance of the alliance. Meanwhile, the Taiwan Straits Crisis of 1996 and North Korea's firing a test missile over Japan in 1998 fundamentally shifted public and elite opinion in Japan. Previously, both had been comfortably secure that the U.S.-Japan alliance would provide the security and protection Japan needed. Now, with the alliance seeming to unravel and the North Pacific environment, including China's increasing economic and military power, seeming to become more unstable, both countries shored up their security relationship. Fundamental changes in Japan's domestic political situation also facilitated the change, particularly the rapid

¹⁰See Yoichi Funabashi, *Alliance Adrift*. New York: Council on Foreign Relations, 1999.

decline of the leftist parties that had thoroughly opposed greater Japanese military build-up and a closer security relationship with the U.S.

The reaffirmation of the alliance was accomplished both symbolically in the Clinton-Hashimoto Summit Joint U.S.-Japan Declaration and more practically by new Japanese defense adjustments such as the National Defense Program Outline [NDPO, 1996], and negotiated arrangements for the implementation of the Security Treaty—their first revision in almost twenty years (Guidelines for Japan-U.S. Defense Cooperation, 1996). The latter were passed by the Diet and seemed to shift the emphasis of the Treaty from the defense of Japan (Article 5) to regional stability (Article 6). Japan already had an increasingly sophisticated Maritime Self-Defense Forces (navy) of 80 major warships, including Aegis destroyers—probably the third most impressive in the Asia Pacific after the U.S. and Russia—although China's is larger, it is not as modern. These measures to strengthen the U.S.-Japan alliance have raised concerns among some in China that the alliance is moving toward the goal of “containment” of China and that the “eggshell” theory of the alliance providing for the nurturance of a remilitarized and threatening Japan may be a more viable interpretation than the “cork in the bottle” restraining of potential Japanese aggression.

Perhaps China's most concrete concern is the joint development of “Theater Missile Defense” (TMD) by Japan and the U.S. Not only does this program seem to lock Japan and the U.S. into an inextricable technological embrace that might be aimed against China but also has implications for the status of Taiwan (see below).

Nevertheless, the North Korean nuclear crisis has placed China into a pivotal role vis-à-vis both the U.S. and Japan. China is the major country that may have some influence on North Korea, and therefore is crucial to any settlement of the status of North Korea's weapons of mass destruction. China is now the key mediator and player in the 6-party talks still ongoing to help resolve the nuclear issue. However, Japan also may require China's mediating role on another issue with the North Koreans because of the “abduction” North Korean agents of several Japanese citizens over the years with some, or their children, still held there. Japan very much wants an accounting of the fate of its citizens, and quite naturally considers their abduction a serious human rights issue. The Japanese media and public opinion are quite focused on their return or at least confirmation of whether and which among them are still alive. Further, China raised no objection to Japan's dispatch of destroyers (originally conventional, but now including Aegis) to the Indian Ocean to aid the U.S. campaign against the Taliban in Afghanistan. These actions or non-actions on China's part hopefully may help to reassure Japan that China is committed to a responsible regional role in the future.

4) Recent Changes—Territorial Disputes: Japan's much closer security relationship with the U.S. has raised a particular concern in China over the future of Taiwan. Although the 1969 Sato-Nixon Communiqué seemed to apply the U.S.-Japan Security Treaty to Taiwan, this issue has laid dormant since. However, in the legislation surrounding the new Guidelines for the Treaty passed by the Diet, the phrase defense cooperation in “areas surrounding Japan” appears. China became immediately concerned that this was a clear application of the Treaty to the defense of Taiwan and that Japan was now implementing the Sato-Nixon Communiqué in specific ways. Japan's response was to intentionally obfuscate rather than clarify the meaning of this phrase. The official Japanese government position is that “areas surrounding Japan” is not a firm geographic designation but rather one that will be decided depending on the extent to which and how the circumstances threaten Japanese security. This policy is designed both not to encourage China to take over Taiwan by force by clarifying that it does not apply to Taiwan, but also to try to deter such Chinese behavior by not ruling out the possibility that Japan might be committed to the defense of Taiwan under some circumstances. Combined with TMD's potential application to the defense of Taiwan, these matters are of increasing concern to the Chinese government. Whether such vagueness ultimately will prove functional in these regards, or rather only add to Chinese fears that the U.S.-Japan alliance is now squarely aimed at China and a threat to its security, and thus be de-stabilizing for the region, remains to be seen. Further, it is also not clear whether, even if Japan's foreign policy elites are privately committed to Taiwan's defense, the Japanese public is willing to risk a war with China over Taiwan. Much would probably depend on the circumstances of an attack on Taiwan, particularly if it appeared unprovoked or not.¹¹

¹¹The experience of Japan's sending a unit of its Self-Defense Forces to Iraq might also provide a clue. As in many countries in Europe, a large majority of public opinion was against the American invasion of Iraq. If casualties to their SDF unit occur, the reaction of the public-acceptance with equanimity or severe reaction against continuing their dispatch-would provide

Taiwan, however, is now not the only heightened territorial issue between China and Japan. There are also territorial disputes between China and Japan over the Senkaku/Diaoyudao Islands in the East China Sea. Nationalist elements in both countries have staged incidents in the 1990s that inflamed the dispute, either with the encouragement of both governments or at least their winking at them rather than acting to prevent them. Nevertheless, despite occasionally catering to nationalist elements and opinion, both China and Japan have tried to decrease tensions over this dispute and thus far have managed to do so. The U.S. is in a particularly difficult situation regarding this dispute because while it insists that it takes no sides in the sovereignty issue, it also has included the islands in the reversion of Okinawa to Japanese administration in 1972. Japan and China, as well as other countries, also dispute the East China Sea continental shelf boundaries and their economic zones. Here the stakes are higher than the Senkaku dispute because there are oil and gas exploration possibilities in this area. There have been several incidents where incursions of Chinese vessels into waters claimed by Japan have occurred, and occasionally Japanese reaction, but so far both countries have avoided either solving the issue or exacerbating it beyond the level of present irritation.

Implications and Dilemmas for U.S.

There are several ironies of the present situation in East Asia. One is that while during the Cold War the U.S. attempted to "balance" two potential enemies, China and the former Soviet Union, in order to preserve stability in the region. In the post-Cold War period, the U.S. may increasingly be forced into situations where it must "balance" two potentially friendly nations with whom it has extensive economic ties, one an ally and the other very possibly the future most powerful Asian state, while preventing a China-Japan arms race and conflict that would destabilize the entire region. Another irony is that when China was a relatively radical and isolated country, the Japanese public and elites were sanguine about its threat to Japan; but now that China is moderating its foreign policy behavior, seeming to try to become a responsible member of the international community, and attempting to dampen tensions with Japan, Japan is perceiving China as a possible increasing threat.

The increasing potential for conflict in the China-Japan relationship because of perceived security threats on both sides, the continuing lack of resolution of the historical memories issue, increasing economic rivalry and trade friction, and the exacerbated territorial issues including Taiwan, all pose major policy dilemmas for the U.S. I can only raise these issues here in the hope that sensitivity to them among policymakers in Washington will aid in finding eventual ways to efficaciously manage them:

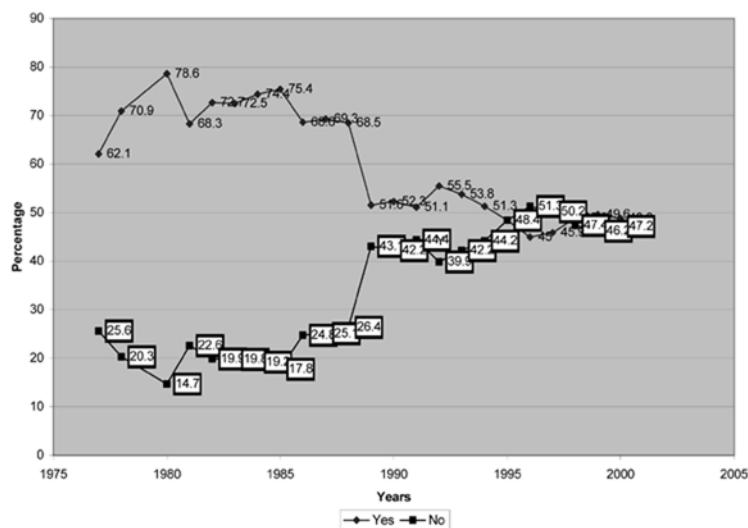
- How can the U.S. maintain its crucial security alliance with Japan while avoiding the "security dilemma" with China, whereby measures taken under the alliance designed for defensive and stability goals are not misinterpreted by Chinese elites as threatening, especially given their continuing suspicions that the U.S.-Japan alliance may be an 'eggshell' nurturing Japanese militarism?
- How can the U.S. send clear signals to China about Taiwan not being taken over by force and hope for Japan's cooperation in event of crisis, without necessarily relying on the latter or exacerbating China's suspicions about the alliance? To what extent can the U.S. trust that Japanese public opinion is willing to risk war with China over the defense of Taiwan in the case of a crisis?
- How can the U.S. compete against Japan in the China market and foster Chinese economic growth, even while discouraging too much economic rivalry or disastrous trade disputes that might inflame tensions between the two countries?
- How can the U.S. not get involved in the two countries territorial disputes and promote peaceful settlements of these issues without offending either?

The peace, security, prosperity, and prestige of the U.S. and the Asia-Pacific depend on our finding effective answers to these dilemmas created by the Japan-China relationship.

some indication of the public's willingness to sustain sacrifice for the alliance outside of Japan's defense.

APPENDIX

Figure :Japan's Prime Minister's Office Poll -Do You Have A "Close Feeling" Toward China?



Source: Figure reproduced from Tsuneo Watanabe, "Changing Japanese Views of China: A New Generation Moves Toward Realism and Nationalism" in Carolyn W. Pumphrey eds. "The Rise of China in Asia: Security Implications" published by Strategic Studies Institute, U.S. Army War College, January 2002).

Chairman ROBINSON. Well, thank you very much for that fascinating component which the Commission is most interested in and has not heard enough of, namely, the Japan-China relationship and its implications. And you can be sure that you'll be—there will be questions on this. I would like to now turn to Dr. David Lampton, who is professor of Chinese and East Asian Studies at the School of Advanced International Studies at Johns Hopkins University. Delighted you could be with us, and we look forward to your remarks.

**STATEMENT OF DAVID M. LAMPTON, Ph.D.
PROFESSOR OF CHINESE AND EAST ASIAN STUDIES
SCHOOL OF ADVANCE INTERNATIONAL STUDIES
JOHNS HOPKINS UNIVERSITY**

Dr. LAMPTON. Well, thank you, Mr. Chairman and Commissioners. Good to be with you. Good to be back in the state in which I was born, although I've lived more of my life outside the state. I left this state 30 years ago, and the Silicon Valley, where I grew up, was just apricot orchards. And there were two guys working in a garage at that time, Hewlett and Packard—literally a garage.

And those developments not only transformed this state, but really transformed the world. What you heard yesterday was a reflection of what's possible when you have the correct combination of government policy, innovative people working, and education and so on.

Yesterday what was referred to as “the San Diego” line is actually, I think, the crystallization of the experience this state’s had. And I think it’s an excellent departure point for U.S. policy.

Every part of the country, this complex country, has its own problems. But what we heard yesterday was a whole lot more than the San Diego line. I think it was a guidepost for where we should go.

I have been asked to talk about Chinese power and what it means for the United States. And my testimony and my written remarks will be compatible, but not identical.

Listening to yesterday I came away with two takeaways. Yesterday’s testimony and the questions and interaction were really the best public education program I’ve heard in a long time.

My two takeaways from that are. One is that security is not just about identifying threats, although we all know about that. It’s also about seizing opportunities faster than the other guy. That’s been our comparative advantage and it is where we ought to move. A second takeaway was that we have an opportunity, as Dean Cowhey said, to build a “Pacific Community.” And this isn’t justairy-fairy, sort of a community ethic and spirit. It’s really the only way we are going to stay competitive in an economic and cultural sense. So I think yesterday was a very important day. Now, I would like to make three points on China’s power and what it means for the United States:

First of all, China is getting stronger. And power isn’t just undifferentiated; there are at least three kinds of power. I want to talk just briefly about those three kinds of power and how China is getting stronger in each.

Secondly, there is no doubt that this is going to require of the United States some adjustments. Some will be much more painful than others. And there will be some genuine threat, as well as opportunity, in this growth of Chinese power in a comprehensive sense.

But, finally, the potential gains that we face from the growth of Chinese power are much greater than the potential problems, if we play our cards right. I see more opportunity in the growth of Chinese power than worries if we have the correct mix of policy. What kinds of power do I mean?

I mean essentially guns, money, and ideas. Sociologists call it remunerative power for money, coercive for guns, and normative for ideas. But those are essentially the three kinds of power. And China is getting more powerful along each of those dimensions.

If you look at the bilateral trade statistics in Asia, China is becoming the major purchaser of what more and more countries in Asia are selling. You look at the percent of each Asian country’s exports going to China, and almost uniformly it’s going up. In 2002, for Taiwan and the Republic of Korea, China became the largest market for each of those economies. And they’re at the cutting edge of that development. China is becoming the biggest buyer of what Asia has to sell, or a bigger and bigger buyer.

Everybody who’s ever been in business knows that when you have something you want to sell to somebody, your buyer becomes a very important person or entity in your life. China’s becoming more powerful because it’s buying more and more of what people

in Asia have to sell. You can see this money power in other dimensions.

China's the No. 2 holder of U.S. Treasury notes. I met with the former Minister of Finance, Xiang Huacheng, some time ago over breakfast.

He said, Professor Lampton, all this about Treasury notes, it's all perfectly true. But we also hold corporate paper. We hold municipal paper. We hold state paper. The debt that China holds of the United States is much bigger than just Treasury notes. If you look at another form of money power, China's becoming a major investor in Asia. Chinese FDI in ASEAN last year—or in 2002, the last year for which we have full figures, went up 60 percent. So the notion that Chinese power is just us investing in them is only part of the story. China is investing, particularly in natural resources all over the world, including Southeast Asia.

Turn to military power. I won't spend much time here because I know other hearings have addressed this subject. But China's defense budget is going up at a pretty good clip, although lower last year than in the past, but still pretty high.

If you look at other activities China's undertaking in the military area, it's now cooperating in joint military exercises with Pakistan, India, Kyrgyzstan, Kazakhstan.

So China's military is reaching out and I think largely for cooperative reasons in the region and indeed beyond.

-Turning to normative power, we're not very used to thinking about the Chinese as having idea power. But, in fact, they are gaining here in a number of ways. Just let me give you one figure on that. We've always thought that the big attraction America had was bringing students from around the world to universities such as the University of California at San Diego. That's absolutely true. China now is beginning to draw students from all over Asia. At Peking University alone there are 3,000 foreign students, 800 of whom are from South Korea. China's development model of stability, of rapid growth is attractive throughout much of the world. The United States is not the only nation with ideas that are proving attractive.

Now, this growing power—whether it's idea power, military power, economic power—is going to require some very important adjustments in U.S. policy and thinking. It's going to have a number of effects.

First of all, just look at the effect on the Republic of Korea-U.S.-Alliance. The long and the short of it is that since 1992, Korea has developed important economic and security relations with China. And you will find right now that the South Koreans often,—particularly with respect to Korean peninsula issues, find themselves agreeing with the Chinese more than us, and this is one of our allies!

If you look at Deputy Secretary Armitage's visit to Australia in early 2002, he raised the issue of a Taiwan conflict scenario. And if there was conflict, he indicated that we expected the Australians to be with us.

There were a lot of Australians that questioned that assumption very publicly. So China's power is going to have implications for our alliances.

Certainly another impact will be on the utility of economic sanctions in U.S. policy. I would just call your attention to page 5 of my written testimony. I think I put it pretty succinctly.

Sanctions are going to be of declining utility when you recognize China is only part of a very long production chain. As I put it, if on a given \$1 item produced in China and intended for export to the United States, China's value added is 15 cents per dollar, \$1 of U.S. sanctions directed at this product will inflict 85 cents of pain on Washington's other friends.

Using such a policy instrument too frequently is both bad economics and bad politics. In short, because China is now so integral to the global production and supply chain, we are not going to be able to just target our punitive economic measures at China. It's going to hit all of our friends starting with Taiwan and Hong Kong and working throughout Asia.

o the long and the short of it is that the rise of Chinese power is going to affect the kinds of tools that we can use.

I think it's also going to force us, as Dr. Shirk said, in a more multilateral direction.

The -Six-Party Talks that are going on and off with uncertain results is indicative of where China's pushing. It's pushing for more cooperative security arrangements. And, it remains to be seen what the ultimate effect of rising Chinese power is going to be on our alliance with Japan and Korea. We're going to have to think about providing security in a much more multilateral way.

Rising Chinese power is also going to make our friends throughout Asia less responsive to a lot of the calls we make.

A couple of weeks ago there was a lot of talk in Washington about calling for revaluation of the Chinese currency. You'll note many people in Taiwan didn't even support that kind of policy.

So the long and the short of it is that we have problems and challenges. But, where are the opportunities?

I think a strong China is going to be more helpful to us in solving some of the security problems we have. North Korea is a good example. A poor China, if you think about that, isn't going to have the middle class that's going to develop hopefully in a more democratic direction. Certainly a poor China isn't going to buy much of what the United States has to sell.

And, finally, a poor China isn't going to be very helpful to us in security in Asia. The China we see now is inclined to help us with respect to Pakistan and on things like the Container Security Initiative and so on.

So, China's getting stronger, that presents problems, but I would much prefer the gains that I see coming from a strong China than fear the downsides, if we play our cards right.

[The statement follows:]

**Prepared Statement of David M. Lampton, Ph.D.
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China's Growing Power and Influence in Asia: Implications for U.S. Policy

China's Influence Is Growing:

There have been six post-9/11 alterations in the regional and global security environments most significant for American interests and the prospects for continued U.S.-China cooperation, security and otherwise:

- China's economic and diplomatic clout in Asia has dramatically increased since 1997, in the context of a Washington preoccupied elsewhere and a less economically potent Japan. China's increased power is reflected in the realms of economic power (remunerative), military power (coercive), and even ideas (normative), with the increase in economic influence being most dramatic. Further, in its diplomatic strategy in the region and the world beyond China is leading with its economic power, placing less emphasis on military power, with Taiwan being the principal exception in this regard. Nonetheless, American pre-eminence in Asia remains the central geopolitical and economic fact, a circumstance reflected in the PRC's priority on maintaining productive relations with Washington.
- North Korean nuclear weapons programs have fostered Sino-American cooperation to a degree few would have predicted in November 2002, simultaneously strengthened U.S. cooperation with Japan, and have had the opposite effect with respect to Seoul-Washington ties. China's diplomatic heft has gone up by virtue of its efforts to broker a non-disruptive resolution of the crisis.
- Japan gradually is assuming more responsibility for its own defense and beginning to provide limited "global, public security goods," a development that is occurring with American blessings and Chinese wariness. Simultaneously, Japan is developing ever-deeper economic ties with the PRC and Beijing is not making an issue of Tokyo's changing security role, though it is worried. The U.S.-Japan alliance is strong, in part as a hedge against a rising China, and, Chinese leaders have partially conceded that the U.S.-Japan alliance has given Beijing a "free ride" on security. The net is that China seems reconciled to a more "normal" Japan and the U.S.-Japan Security Alliance as long as neither are aimed at promoting the separation of Taiwan or containing China, concerns that never will be fully assuaged in Beijing.
- South Korean-Chinese economic (and to a lesser extent security) relations have grown with remarkable speed since the two nations established diplomatic ties in 1992. Today, Beijing and Seoul often have been closer on inter-Korean Peninsula issues than Washington and Seoul. The ROK-US alliance relationship is troubled, raising the issue of its long-term prospects.
- The War on Terror (here to include the war in Iraq and counter-proliferation policy) has fostered growing and important Sino-American cooperation. Cooperation in this domain has reduced some of the vigor with which Washington's demands on China in some other domains (economic and civil rights) are pursued. Beijing was (and remains) very helpful in the War on Terror and it served minimal American interests by getting out of the way with respect to Iraq.
- With respect to Taiwan, the core friction in U.S.-China relations since 1950, micro-nationalism and competitive electoral politics have energized Taipei's increasing efforts to assert autonomy. This threatens Beijing's and Washington's interests to the extent that a conflict in the Strait could ensue that neither capital desires. For now, this has produced Sino-American cooperation (perhaps limited and temporary) and generated growing friction between Washington and Taipei. American allies and friends increasingly are allergic to a Taiwan Strait conflict and Tokyo and Paris have urged restraint on Taipei in the run up to the March 2004 presidential elections, as did President Bush on December 9, 2003.

Cumulatively, the developments highlighted above reflect the comprehensive growth of Chinese power in the realm of money, coercive force, and ideas. What are the implications of China's rise for American interests, broadly defined?

Implications for the United States:

It is inaccurate to say that Asia has become Sinocentric. The economic and military power of America remains a central geopolitical and economic fact for every nation on the PRC's periphery. Moreover, China is not yet a balanced comprehensive power; its coercive and normative power still weak compared to its growing eco-

nomic muscle. Also, China's influence remains uneven around its circumference—strongest on the Korean Peninsula, weakest (but growing) in Central Asia, and growing briskly throughout East and Southeast Asia. Moreover, it is fashionable, but mistaken, to ignore Japan's current power and future potential because of its protracted national malaise. And finally, at the same time that the PRC's neighbors seek to gain from enhanced Chinese capabilities, they also seek more distant balancers to hedge against Beijing's power.

While neither the United States nor others ought to overreact to China's increased power and influence, the success of Chinese policy does have implications for America. The most important of these implications is that the principal directions in which Chinese policy has moved (toward the use of remunerative and normative instruments, and away from coercive power [except with respect to Taiwan]) are consistent with fundamental U.S. interests. Washington ought not deflect China from its basic heading. Nonetheless, rising Chinese power requires some adjustments, and perhaps profound changes, both in U.S. policies of long-standing and those of more recent vintage. China's rise has implications for regional alliance and security structures, the kinds and mixes of power America exerts in the region, and Washington's ability to use sanctions and other instruments of policy.

A key point is that Washington's post-9/11 mix of power, in the eyes of many throughout Asia, has overemphasized military strength and takes insufficient advantage of America's economic and potential normative muscle. Normatively, the United States now is less attractive throughout Asia than it has been in the past, if almost any public opinion survey is to be believed. Washington has become too distracted. Americans need to do more listening throughout the region. Finally, Washington needs to place more emphasis on multilateral security and economic relationships. As well, the difficulties visa issuance are creating to economic and cultural exchange are a serious impediment to the effective employment of American economic and normative power.

With respect to the realm of coercive power, perhaps the most dramatic consequence of China's rise has been the weakening of the U.S.-South Korea Alliance and the longer-term effects that China's growing strength may have on Washington's other regional alliances. While growing Chinese military power may strengthen the perceived need in Japan, the Philippines, and perhaps Australia for alliance with Washington, the PRC's growing economic attraction and its currently benign foreign policy may simultaneously lessen the perceived need for these pacts. Which of these contending forces prevails (the China threat or China's attractiveness) will depend greatly on how both Beijing and Washington play their cards in the future. Thus far, Beijing has played them skillfully.

In the case of South Korea, the strains in the U.S.-ROK Alliance already are everywhere apparent. Beijing's economic attraction to Seoul, China's greater leverage over North Korea than any other outside power, and a U.S. policy toward Pyongyang that worries South Koreans cumulatively have put China in the catbird seat. While it is far too early to pronounce the death of the U.S.-ROK Alliance, restoring its vitality is going to require changes. In the more distant future, Washington may have to consider whether a new security framework (perhaps involving the six parties in Northeast Asia) is needed to replace or supplement the traditional bilateral alliances in the region.

Turning to the Taiwan Strait, this is the one issue that, if mismanaged (by Taipei, Beijing, and/or Washington), could produce a dramatic increase in the acquisition and use of Chinese coercive power. The many deficiencies of Beijing's policies toward Taipei, combined with micro-nationalism on the island, create recurrent pressures on Taiwan to assert autonomy in ways that are dangerous. Washington's policy of deterrence has helped restrain Beijing from either overreacting to Taipei's actions or being proactively coercive. But, Washington should be no less vigilant with respect to Taipei's actions. The ball on which Washington should keep its eye is stability and growth in the region as a whole and encouraging Beijing to remain on the policy trajectory described above. This likely will require U.S. administrations and the U.S. Congress to periodically be firm with Taipei. President George W. Bush's December 9, 2003 statement in front of visiting Chinese Premier Wen Jiabao ("The comments and actions made by the leader of Taiwan indicate that he may be willing to make decisions unilaterally to change the status quo, which we oppose.") is an example of what periodically may be required.

Even more fundamentally, as more and more American allies and friends in the region develop positive stakes with the PRC, how supportive are they likely to be of an American intervention in the Taiwan Strait? When Deputy Secretary of State Armitage went to Australia in early 2002 and suggested that Washington expected Canberra to be at its side in a Taiwan contingency, former Australian Prime Minister Malcolm Fraser said: "[The Australia-New Zealand-United States Defense

Treaty] designed to achieve Australian security is now being distorted potentially to embroil us in a conflict of America's choosing with another super power [China]."

The PRC's rise also has important implications for the remunerative realm of U.S. policy. Most fundamentally, as the PRC increasingly becomes an engine for regional and global economic growth, the strategic importance of stable ties between Washington and Beijing will grow beyond narrowly defined security interests.

The fact that China is embedded deeply within key global supply chains and increasingly has become the final assembly point for products that incorporate the value-added components made by many of America's friends throughout the region, means that Washington increasingly will discover that to economically retaliate against China is to economically strike America's allies and friends. Put crudely, if on a given one-dollar item (produced in China and intended for export to the United States) China's value-added is 15 cents per dollar, one dollar of U.S. sanctions directed at this product will inflict 85 cents of pain on Washington's friends. Using such a policy instrument too frequently is both bad economics and bad international politics.

U.S. multinational firms that have invested in the PRC both as an export platform and as a base from which to penetrate China's domestic market increasingly will resist unilateral, punitive impulses in Washington. Moreover, the degree to which China recycles dollars earned in this globalized trade into the United States (in the form of U.S. Treasury notes and other debt instruments) means that Washington increasingly will find it difficult to punish Beijing without punishing itself—China is the number two holder of U.S. Treasury notes after Japan.

Further, as more and more countries become significant suppliers to China, they may well find that their economic interests often parallel those of the PRC. For example, when in late-2003 and 2004 many in Washington called for Beijing to revalue or float its currency, few in Asia supported the U.S. position. As Taiwan's China Post put it, "So the notion of getting Beijing to relax its currency controls—an American economic priority—is hardly a top goal in this part of the planet."

Turning to the realm of normative power, the United States needs not only to pursue the war on terror and associated activities, it also must devote more economic and diplomatic effort to remaining a nation that attracts through the power of positive example.

If it is to replenish its stock of soft power, the first place the United States must begin is by placing greater emphasis (both rhetorical and financial) on economic, social, and political development through institution building, talking more about development as a process rather than simply as an end state in which there is democracy, rule of law, and human rights.

The developments enumerated above point to something very fundamental. China is becoming a more adept player in the emerging regional and global orders—America must adapt its economy and its policies to the logic of the system it has played a central role in creating. China's rise could be profoundly positive for America and for the world system, or it could lead to friction and conceivably conflict. If positive outcomes are to occur, it will be because both countries responded positively to the opportunities for cooperation that interdependence creates.

Panel I: Discussion, Questions and Answers

Chairman ROBINSON. Well, thank you for that. I must say that these were extraordinary and certainly will frame this morning's discussions. I couldn't think of more timely division—well, topics for a division of labor here.

I would like, if I might, in commencing the question period to take the prerogative, which I rarely do, and ask a question myself of Dr. Krauss. Because, as I mentioned, one thing we don't get quite enough attention to is the bilateral or trilateral, as you've put it, U.S.-Japan-China relationship.

And one thing that's been of great interest to us is the fact that Japan studiously avoids using the term "China" as a prospective threat for the future, even though arguably if you look at their military procurements and you see new Aegis destroyers, SM3 missiles to presumably serve off of that platform as high-altitude missile defense, PAC-3 missile batteries, aerial refueling tankers in part for their AWACS and fighters, which are top of the line in the

case of the AWACS, and indigenously manufactured maritime patrol aircraft that is of high priority for them.

We see that—if you look at the timetable for those procurements and you recognize that Japan is—finds it politically acceptable to focus on the North Korean crisis as a catalyst for those procurements, but when you think about when those items are really going to come on line, depending on your North Korean crisis scenario, whether it's just going to be a containment strategy for a nuclearized North Korea or whether this could get far more sporty in the next couple of years, the North Korean event would not be, I think, the subject of concern that it is today in 2005, 2007, when these front-line systems start coming on stream, which begs the question, what are they for? And, of course, those of us that look at this from time to time would argue that China is the longer-term threat.

Now, you're not going to hear those words in Japan or see them on paper, but do you see a time when this situation too, Dr. Krauss, will evolve somewhat and you'll start to see, first, elliptical references like the one that you mentioned about their interest in, quote, the surrounding areas tend to get a little more explicit over time? Or do you think that Japan will maintain this awkward silence on what has to be regarded, given its robust military buildup and its offensive quality, a China threat for the future?

Dr. KRAUSS. That's a good question and a complicated one.

I must say I think you're absolutely right. I think the situation of China, to some extent in the United States, although less than in Japan, is a little bit like all of us sitting on the couch sipping tea while there's an elephant sitting right next to us. Nobody's talking about it. But I think the concern over North Korea is genuine. I don't think that that's just a facade for a cover for doing what they would like to do for China. Japan was—and Japanese public elite was profoundly shocked by the Taepodong missile going over Japan.

It so happened that the Taiwan Straits crisis and China's emergence as a stronger military and economic power has all occurred simultaneously in the last decade with the North Korea threat as well. So it's very hard to disentangle those. But, as you say, I have no doubt in my mind that the Japanese political elite, at least, is looking down the road to the potential threat of China, as well. And this may be a longer term, more subtle motivation for it to move closer to the United States in terms of security.

I just want to point out the continuity to some extent in Japanese policy. And people don't often recognize that the Yoshida Doctrine in 1951 and '52 in which Japan separated security and economics and essentially said, "we're going to rely on the U.S. for security and we're going to do what's minimally necessary to keep them protecting us, while at the same time we're going to concentrate on economic growth," is in many ways still the Japanese policy.

Japan is much more independent or autonomous of the U.S. economically and is hedging its bets rather strongly, even while doing what it needs to do and even more so, in some cases, in order to keep the U.S. security treaty strong, and these days even stronger. I mean sending Self-Defense Forces to Iraq is not about sending

Self-Defense Forces to Iraq. It's about ensuring that Japan has a good—a voice at the table with the United States and also keeps good relations with the Bush Administration when they need the United States in the North Korea issue.

It's a nested game within the North Korea issue because, frankly, the Japanese don't care that much about Iraq. And Japanese opinion has been very negative on it.

I don't know if it will become more explicit over time. I don't think so because of the economic integration with China. And it doesn't serve Japan's interests to threaten China. And the Japanese elite, despite its impatience with China over the history issue, is still sensitive to their feelings on this.

So I think we may have that elephant sitting on the couch with us for some time.

Chairman ROBINSON. Well, thank you very much.

I would like to turn the microphone over to Vice Chairman D'Amato at this juncture.

Vice Chairman D'AMATO. Thank you very much, Mr. Chairman.

And I want to commend all three panelists for very thoughtful and provocative testimony. I have a few questions for Professor Shirk and also Professor Lampton.

I think you're absolutely right that there's been a lack of attention to the region as a region. Regional diplomacy has been greatly lacking. The lack of institutions in the region contrasts directly with the tremendous successful effort we made in Europe over the years to build regional institutions. I also want to commend you for your efforts on Track 2 on North Asia. I think that's a very, very important contribution to American diplomacy in the region.

And I certainly think that we believe that a multilateral solution to the North Korea issue is far more attractive than bilateral diplomacy. In fact, the chairman and I have recommended to the congressional leadership a while back that the leadership consider seriously and insisting on this being treated as a treaty. The reason being that making it into a treaty would require a building of a consensus across the aisle in the Congress in the fashioning of an agreement that would stand the test of time, as it would normally do in any situation where you were able to bring the Congress on board.

I think that was the great flaw in the framework agreement. The Congress was not brought in in a way to build bipartisan consensus. There was partisan bickering almost immediately. The ink wasn't even dry on the agreement.

And that would have been avoided had the Congress been brought in. It's a very difficult thing to do that, but the rewards are terrific.

So I think that multilaterally in bringing the Congress in, in an area where we're talking about proliferation, the kind of problems that focus the country, would certainly—qualifies, I think, for treating it as a treaty.

And, by the way, both the Japanese and South Koreans have told us that they would have to bring any type of multilateral agreement to their legislative bodies for approval. So they would have to go through the process of bringing about consensus building in their legislatures. I also think your proposal, your idea, which is

bureaucratically radical, but certainly intuitively, sounds very valuable—to put a high-ranking diplomatic official permanently in Hawaii.

I actually do think that's a very, very good idea. I certainly think it would be something that this Commission ought to consider recommending in terms of its report to the Congress because I certainly think that that kind of signal to the region would indicate we were serious about multilateral diplomacy, and diplomacy throughout the region has been lacking. In fact, I was involved when I was working in the Senate in creating a center as a component of a CINE PAC, which is known as the Asia-Pacific Center.

And much to the dislike of the administration, I may say, who we had to force—as you may remember, we wrote that, legislation and then every year afterwards funded it through legislative initiative, the Clinton administration refusing all those years to even fund the center in Hawaii, which, of course, was intended to bring about military cooperation within the region. And I would also say that we recommended in our first report that the United States make a much greater effort to deal with the Chinese more successfully in building the creation of what are known as confidence building measures with the Chinese military. They're almost totally lacking. And, in fact, what we discovered to our surprise was that Chinese have been very willing to build a rather detailed series of confidence-building measures with almost all the States on its periphery, including Russia, including India which it went to war with, including Southeast Asia, Laos and Viet Nam. And if they can build confidence-building measures with Laos and Viet Nam, it seems to me it would be useful to try and do that, which we did with great success with the Russians. And we've been very, very unsuccessful in doing that with the Chinese, which proved to be very dangerous. When we had the reconnaissance plane incident in Hainan, there was absolutely nothing in place to try and mitigate that crisis in the way of institutions and confidence-building measures.

I have two questions. One is in terms of multilateralism, we looked into the question of Chinese energy development. And, of course, they're going to become far more dependent on an accelerating basis on imported oil. And, of course, are in a frantic quest worldwide to build secure supplies of petroleum products. The question is, whether or not that's going to be competitive with the west and the United States or whether it's going to be cooperative. So the question is, what kind of effort do you think we ought to engage in to bring the Chinese into the IEA in terms of building more cooperative solutions to mitigating the problems that will arise as a result of, let's say, an OPEC-created supply disruption or embargo in the future, or to try and build various kinds of cooperative arrangements in terms of the supply of oil to mitigate price gouging in the future?

That's the International Energy Agency I'm talking about here.

Dr. SHIRK. I can't answer that question because I'm not familiar enough with how the International Energy Agency operates and its practices and rules on managing oil markets. But let me address it from another angle. China's dependence on imported oil, especially from the Middle East, is one of the reasons that it has be-

come more concerned with preserving peace and stability in that region, as well as in other regions.

Because, frankly, it went through the same evolution of its policy that we did. First trying to cultivate a special relationship with an oil supplier, like Iran or Iraq. And then later seeing that that can be very dangerous because if that country is a spoiler, is a kind of troublemaker in the region, then everybody is going to pay more for oil. And you will not be protected from that.

So now I think China has a fairly cooperative attitude with the United States in preserving a peaceful Persian Gulf region.

But, also, I think there are real opportunities here in the Asia-Pacific for cooperation based upon the common dependence of all the countries in that region on imported oil. And one of them is the protection of the sea-lanes of communication. That's something that the United States has been doing alone, basically providing a collective good to the whole region at our expense. And, of course, it enhances our military influence in the region to do it that way.

But I was just reading yesterday how China is actually considering building a canal through the Thai peninsula because the Strait of Malacca is such a perilous passage, especially in this age of terrorism.

And they have, as many countries in that region do, some real anxieties about whether or not these tankers are adequately protected against a terrorist threat coming through the Strait of Malacca.

During our Afghanistan and Iraq conflicts, the U.S. Navy, which had been stretched thin by having to engage in all these different theaters, actually delegated to the Indian Navy some of the job of patrolling the Strait of Malacca so that we could take our ships to do other things. Now, this is a potential confidence-building measure, I think there's a potential for a more cooperative approach to patrolling the sea-lanes of communication in the region.

Frankly, the U.S. Navy has never really been keen on that because they like their monopoly on that job. But it has a lot of potential for building a cooperative relationship and, by the way, helping the U.S. meet an important function in a more efficient way.

Vice Chairman D'AMATO. Thank you very much.

Dr. LAMPTON. I think that's a very interesting question you've asked.

And I agree with what Susan said. I would also say that yesterday's testimony by Dr. May testimony is relevant to this question, and the power of markets to deal with this issue.

But I think the way I would answer the question is to look at the ways in which China is trying to deal with this energy problem that it has. It certainly wants a stable Middle East and in that sense, strategically shares an interest with us, although China doesn't always agree how you're going to get that; but they want that result.

The Chinese also are trying to build a strategic oil and petroleum reserve so that they can be insulated from the worst oscillations and not be forced into precipitous behavior. I think that's probably in our interests.

They are also trying to diversify their sources away from a particularly volatile region working in Africa, Venezuela, Australia, Indonesia, and so forth.

Also, they're inviting in the foreign oil producers. Originally they started only having foreign energy firms offshore: now we're getting more and more involved. I was just in a meeting with BP Amoco.

They're talking about building a natural gas line from Russia into Northeast China. So I think there are commercial opportunities for the U.S. Also, the PRC is trying to conserve energy and actually has a pretty impressive record on energy conservation. And that could help U.S. exporters of technology and so forth.

So I think the Chinese are trying to deal with this energy problem in a responsible way. And, for the most part, I don't see a big conflict of interest yet.

Vice Chairman D'AMATO. Thank you very much.

Chairman ROBINSON. I would like to turn to Ambassador Ellsworth next. Ambassador Ellsworth, as you know, is cochairman of this field investigation.

And, again, this morning we want to reiterate a point made yesterday, which is we owe him a great debt of thanks for all he did to coordinate with the University of California at San Diego and many of the team in front of us today to make this highly valuable event transpire. And with that, I would like to turn to Cochairman Ellsworth.

Co-Chair ELLSWORTH. Thank you, Mr. Chairman.

Well, I have three or four specific questions, which I'll get to quickly. But first I want to tell you how much I appreciate the panellists this morning, and hearing the way they think. They draw things together. They don't just deal with this little problem and that little problem. But if they do, they bring it all together. Your comprehensive way of thinking and talking about China and its surroundings is very much appreciated. Following up on the energy discussion about China's expansion and diversification of its energy sources.

One of the most interesting to me of their efforts to diversify has been their interest in a huge gas deposit in Siberia called Kovyktinskoye Amphitheater. It's the name of a big geological formation up by Lake Baikal. It's a huge gas deposit.

The Russians want to monetize it, that is, sell it for money. And the Chinese need it for their diversification of energy sources, and that's going to happen.

BP already owns 25 percent of that particular gas deposit. And they're talking, in turn, to some American companies that they might draw in and help develop it.

And it's going to require a huge transmission line for the gas. It's going to use all the steel capacity of everybody that produces steel in the world to build this pipeline within a reasonable amount of time. So it's a big deal. And accordingly, it's taking a long time to work it out between the Chinese and the Russians.

And in that process—I'm sure, just as the same kind of an arrangement between the Russians and the Germans many years ago had a huge effect on geopolitics, was heavily responsible for Ostpolitik in those days. So now I want to come, to your remark, Dr. Shirk, about the Shanghai Cooperation Organization, the SCO.

Even before the development of the SCO, the Russian Prime Minister, Mr. Primakov, was talking about the development of an anti-hegemonic alliance between Russia and China.

And ever since that has stimulated a lot of comment in the press and in academia and in the corridors of power about how that is an incipient possibility, an anti-American alliance between those two great powers.

I wish you'd comment on that, including the geopolitical effect of this huge transfer of gas from Siberia to the east coast of China.

Dr. SHIRK. Well, thank you very much for the question. I do believe that the China-Russia relationship is very important, and we need to pay close attention to it, especially when we're talking about the regional context.

Let me describe in very bald terms what I think the situation is in Sino-Russian relations.

The Russians have tried at several points in time, including when Primakov was there, then later when Putin came in, right at the beginning of the Putin reign, to try to develop a common front with China against the United States. And from my knowledge, I believe that the Russians really took the initiative on this in trying to build common cause with China. And in some cases they even talked about maybe bringing India in as a coalition to block and restrain the United States. One focus of it was national missile defense. Before Putin agreed to strike a deal, before he turned and decided to cooperate with the United States in our leaving the ABM treaty and moving forward with national missile defense, he was trying to build a coalition against it. The Chinese have always been very cautious about this idea because, frankly, given the state that Russia is in these days, it really doesn't look like a winning proposition for China to join with Russia against the United States.

From China's perspective, they're much better off trying to cooperate with the United States. They're better off economically. They're better off politically.

And so—although from time to time they'll issue some pronouncement with the Russians just to keep us on our toes and to remind us that they always have the option of going in that direction, they don't think it's a winning proposition for them.

Also, there's a lot of remaining mutual suspicion between Russia and China. My perspective on this is that it's a self-limiting relationship, that the United States doesn't have to do anything to try to prevent Russia and China from getting closer because I don't think they'll ever be very close again.

Co-Chair ELLSWORTH. Let me just follow up if I can, Mr. Chairman.

Chairman ROBINSON. Please.

Co-Chair ELLSWORTH. And I mentioned that already, back even in the depths of the Cold War, German Ostpolitik developed to some extent out of its dependence on energy supplies from Russia.

Now then, you've implied, though you didn't really say, that the Chinese have considered in recent years this Russian idea of an anti-hegemonic alliance, though they've rejected it for good and sufficient reasons.

But now cast your mind five or ten years into the future. If they have considered it and if they become dependent for energy on Rus-

sia and if they continue to consider it, isn't that something that we ought to be thinking about and noticing and tracking?

Dr. SHIRK. Well, I think it suggests that we have an interest in China diversifying its energy suppliers, just as Mike Lampton said. And, therefore, instead of trying to discourage it, it suggests that it's something we should encourage in order to reduce the dependence of China on Russian energy supplies.

Co-Chair ELLSWORTH. Now, one more quickie, if I may.

In speaking about China's role in Asia and your brilliant comprehensive overall, you didn't once mention the word "Taiwan"—which is—if I can say so, at least consistent with the Chinese view.

But Professor Krauss mentioned Taiwan very interestingly—in a way that I had never heard of before. And that was that Japan has implicitly included Taiwan—

Dr. KRAUSS. Maybe.

Co-Chair ELLSWORTH. —contingent on future developments in its sphere of security. Just give us a few words of your wisdom on the Taiwan situation. We're in the middle of a kind of an uproar about Taiwan because of the presidential election.

Dr. SHIRK. I didn't talk about Taiwan because I was talking about multilateral diplomacy.

Co-Chair ELLSWORTH. Right.

Dr. SHIRK. And, of course, China would like to freeze Taiwan out of all those multilateral activities.

Co-Chair ELLSWORTH. Right.

Dr. SHIRK. APEC is the one that Taiwan is a member of. And I think that's one reason that China is somewhat less enthusiastic about APEC than it is about some of the other multilateral organizations in the region.

Taiwan is the one issue, I believe, in the Asia-Pacific region where the United States and China have somewhat different interests. China is determined to prevent Taiwan independence.

And the United States, frankly, has a kind of ambivalent attitude about that. On the one hand, we don't want to risk a military confrontation with China over Taiwan, and so we want to manage the situation to prevent that. On the other hand, we have a strong commitment to the people of Taiwan, which has grown stronger as Taiwan has democratized. And Taiwan has tremendous breadth of support within the United States from the public and especially from the Congress. So that's the dilemma for the United States.

Co-Chair ELLSWORTH. Thank you.

I'd like to ask Mike Lampton—

Dr. KRAUSS. Can I just jump in here?

Co-Chair ELLSWORTH. Excuse me. Yes. Go ahead.

Dr. KRAUSS. Just on the Taiwan issue. I think I make it a little clearer in my report, but in some ways the Japanese elite is a little out ahead of public opinion on the Taiwan issue especially.

I don't think there's any question in the world that in a conflict in the Korean peninsula, that Japan would be totally supportive and the public would. I personally have some doubts that in a potentially disastrous conflict with China over Taiwan that the Japanese public is going to be willing to risk war over that. I think Japan has a vested interest in making sure China and the United States do not come into conflict over Taiwan.

And I think they're keeping this vagueness, in part, to help deter Taiwan from doing that, as well as to keep their options open.

But it's not clear to me that the Japanese public would support a war against China. It would very much depend on the circumstances, I think, of whether the confrontation with China over Taiwan seemed—China seemed to provoke that confrontation or not.

Co-Chair ELLSWORTH. Mike.

Dr. LAMPTON. Just on Taiwan, I wanted to react to one thing Susan said, and I agree with it, but I would put in a "but" when she talked about the great breadth of support for Taiwan. That's true, and we all know the dimensions in which it's true.

I would add, though, that that support is very much contingent on Taiwan being, let us say, mindful of U.S. national interests. There's a widespread perception that this administration started with a very positive orientation from Taiwan's point of view. I've never, frankly, in the last 10 or 20 years, seen Washington-Taiwan relations more tense. Even more importantly—because somebody mentioned Congress—some people who have been, what we might say, very traditional and strong supporters of Taiwan wonder if the current government in Taiwan is being sufficiently mindful of the fact the United States is tied down in Iraq and Afghanistan and trying to find Osama bin Laden.

There's a further understanding that, yes, the people of Taiwan are entirely—have it within their decision-making purview—to vote on anything they want. But that doesn't obviate the need for the U.S. Congress to, in fact, decide when the United States is going to get committed to war. We didn't delegate that to the people of Taiwan. So I think, yes, there is this broad support for Taiwan, but I think there are limits. And I hope people in Taiwan understand them.

Co-Chair ELLSWORTH. Thank you. Mr. Chairman, thank you very much for the time. And if there's time later on this morning, I'll come back with even more questions.

Chairman ROBINSON. Excellent.

Excellent. That was a very valuable exchange. I would like to turn over the proceedings to Commissioner Mulloy, followed by Commissioners Dreyer, Reinsch, Bartholomew and Becker. Commissioner Mulloy.

Commissioner MULLOY. Thank you, Mr. Chairman.

Let me thank each of the panelists.

I've read your testimony with great interest, and you're helping educate us, which is important. We're not experts, and we're—we value an opportunity to read testimony like you've given us.

Dr. Shirk, you started out by saying that—yesterday we looked at the economic issues and now we're looking at the political issues in the region.

And you all make the point that China's rising economic power gives it increased political and even military power so that the three are all interrelated. And that's the theory upon which this Commission was created. We're called the Economic and Security Review Commission because Congress, when setting us up, accepted that premise entirely.

In fact, we think of going back to the old Golden Rule. And you know what the Golden Rule is. He who has the gold, makes the rules. And we're sending the gold to Asia at a pretty quick pace. The United States is running a current account deficit of \$500 billion this year. We're the largest debtor nation in the world.

And 60 percent of our trade deficit is with Asia. Okay. Now take those premises.

Now, Dr. Lampton tells us that one way we help finance our own budget is that the Chinese, through the dollars they accumulate through the \$125 billion trade surplus that they run with us, they buy U.S. treasuries, which then helps us finance our spending, which we're not taxing ourselves, so it helps keep our interest rates down.

Then the further question that comes up—Dr. Lampton says that this idea that China might be manipulating its currency, I don't think you were too enthusiastic about that issue being raised.

This Commission in September held a hearing on China and other Asian countries manipulating their exchange rates to gain trade advantage. And what does that mean?

That means they intervene in their currency markets to keep your currency under value. What does that do for you?

It makes it easier for those countries to export to the United States. It makes it more difficult for the United States to export to Asia, which then increases our trade deficit with these countries. There's a massive transfer of wealth. Now, the United States in our hearing—we did a hearing in September, and we found out China was manipulating its currency. The dollar has fallen 30 percent against the Euro in the last year and a half. It has not moved at all against the Chinese currency and other Asians who tie their currency to the Chinese.

So the question I have is, Dr. Lampton, you say, it's kind of unseemly to raise that kind of issue. This is what I get from your testimony. For example, you say, quote, "when in late 2003 many in Washington called for Beijing to revalue or float its currency, few in Asia supported the U.S. position."

Well, why would they? They're all benefiting from this manipulation.

You say, as "Taiwan's China Post" put it, "the notion of getting Beijing to relax its currency controls is an American economic priority and it is an American economic priority in both parties and in the administration is hardly a top goal in this part of the planet."

And you seem to imply both in your testimony and what you said here this morning that that's kind of unseemly to raise issues like that. And let me just—because my view is, is kind of like the God-father. This isn't an unfriendly act. This isn't personal. This is business.

And we ought to take it up in a very serious manner. And I just would like to get the panel's views on that because you're political experts, but I think that the two are interrelated.

Dr. LAMPTON. Seeing how, Commissioner, you mention my testimony, let me make it clear, which I think it is in here, the context in which I was meaning that.

I was saying as more and more countries become suppliers of China, they are going to share the economic policy priorities of China. I'm not saying that's a good thing. And in many respects it's probably not in our interest. So I want to make that clear.

But when you have Taiwan—at least a Taiwan newspaper sharing the economic priority of China, there's something going on there. And I'm just saying that as China's economic power grows, don't expect everybody in Asia to go lockstep with us in our demands against China. I'm not advocating that. I'm just describing that. So I want to be clear about that. Also, just with respect to the currency issue. In 1997 and 1998, there was the Asian financial crisis, and everybody wanted China to manipulate its currency—that is, not devalue—and by government fiat keep it stable so there wouldn't be a downward spiral.

So all I would say is when China—China has kept this peg for a number of years. There have been times when we were, in fact, enthusiastically endorsing it, and now we're—let's put it this way, we're opposed to it. So all I would say is you take a longer historic period, and I don't mean decades, I mean just the last five years. There have been periods when we have been urging China to do it, and now there's a period where we wish they weren't doing it.

What I can tell you is I've had some conversations with Chinese economists, and there's interesting things coming out in the Chinese press. I think the Chinese are coming to the conclusion that a limited upward valuation of their currency might be good for them. And I think just as we make our economic policy based on what's good for us, the Chinese do. I don't expect to see it in the next three weeks, but the fact of the matter is I think the Chinese are concluding that their present peg level is contributing to inflationary pressures in China.

So, I think they're thinking about a basket of currencies and so on. But China has an enormous stake in just keeping predictions stable for foreign investors and so on.

So I think we have to be a little patient. But the Chinese aren't totally unresponsive. They make policy based on their interests. And—but my larger point wasn't whether it's good or bad, reasonable or not; it's that as people have more economic stakes with China, they're going to more frequently take China's side.

Dr. KRAUSS. Along with putting it into a broader historical perspective here, the Japanese did the same thing for the last 30 years, keeping their currency above a certain level to some extent, to the extent that they could, below a certain level in order to aid their trade. And in even broader context, all countries do this to some extent. Lest we cast too many stones, I would like to remind people that Nixon let the dollar float when the U.S. was in economic trouble, Reagan kept the dollar high for political reasons, and we negotiated the Plaza Accord when we felt that the yen was overvalued. So, all countries at a certain point do try to advance their own economic interests when they feel that the currency exchange rates are out of line with those interests too far.

Dr. SHIRK. Very briefly, I think in making this a major focus of U.S. policy attention, we should do a cost benefit analysis from the standpoint of U.S. interests.

And on the one hand, the potential benefit would be to narrow the trade gap with China by a small amount. Obviously not by a very large amount because that trade gap is based on a lot of other things, especially labor costs that go beyond the pegged currency. But then on the negative side, think about some of the issues that Mike Lampton has raised about the impact on other countries in the region. And also, think about what we're signaling to the Asia-Pacific in a larger political sense.

After the Asian financial crisis, the Asian countries felt that the U.S. really didn't have their interests at heart, that we didn't have the right approach, and that was the impetus for them to develop the ASEAN Plus Three approach, which leaves out the United States.

If we focus so much and really hammer away hard and apply a lot of gaiatsu on this issue, we run the risk of the same kind of backlash in the region.

Commissioner MULLOY. Thank you.

I hope we can come back to this issue later, Mr. Chairman.

Chairman ROBINSON. I suspect we will. Commissioner Dreyer.

Commissioner DREYER. Yes. I have a couple of quick questions for actually each one of you. And to start with, Dr. Shirk, I was interested in what you said about more multilateralism. And I am wondering if you think it's really going to do any good, because, you see it from a different perspective, obviously, than I do.

And it seems to me I am always seeing Armitage jetting around the world into Asia saying something, or one leader or another. And it does seem to me that we really look as if we're out there a fair amount of the time trying to convince people, but we don't seem to be able to convince them.

And the problem with more multilateralism may be that we try harder, but still don't manage to convince people because, in fact, they don't agree with us.

And, also, to consider the—which they sure don't about Iraq, right?

And the other question is, I suppose, to consider the trade-offs between putting somebody in Honolulu and the problems that causes with the home office in Washington.

And the example, I guess, that comes to mind is the APCSS, which was put in Honolulu to encourage military cooperation, and the head of it developed his own policy, which was different from that of the Defense Department.

Dr. SHIRK. Would you like me to respond?

Commissioner DREYER. No.

Dr. SHIRK. Okay.

Commissioner DREYER. And things like this happen just because bureaucracies tend to behave that way.

For Dr. Krauss, I have been watching Sino-Japanese relations for some years, as you know. And recently Chinese have been saying to me, I think you and I both notice there's just kind of a schizophrenia involved in China's view of Japan.

On the one hand, it's this dinosaur-egg-about-to-hatch militarism. And the other half—the other side of the schizophrenia, people have been saying to me recently, Chinese people, well, you know, Japan is really a declining power. And they can't seem to

solve their economic structural difficulties. And they've got this declining population that's getting older. And, of course, this, what do you say, ignores the fact that China can't really seem to solve its economic structural problems, as well. And more than 10 percent of the Chinese population is also aging, and it's becoming more serious with time.

But I wonder—I know you read Japanese newspapers every day—any resonance in Japan from that? Are there Japanese who would agree with that, and do you see any implications for the future on that one? And, Dr. Lampton—and, again, maybe this is because I misunderstood. But I thought I heard you say that it is China's developmental model that was attracting students from Asia and particularly Korea to China and—to study. And again, my impression—and maybe I'm not right on this—is that it isn't China's developmental model that's attracting these people; it's the hopes of making money from China. And I have yet to hear any student—and, again, I don't talk to the same people you do, but any student saying—from Burma or Thailand or—say, oh, boy, let's adopt the Chinese developmental model.

And, also, a question on, when you say a strong China will be helpful to us in solving security problems. I am a little bit skeptical of that one because it seems to me that China will help us solve security problems when China sees the security problem the same way we do. But the problem just thus far is we—we and the Chinese don't seem to see the security problems from the same point of view.

That's it.

Dr. SHIRK. Just very briefly. I'm not surprised that folks in Asia don't agree with the United States on Iraq. And I don't think that regional multilateral involvements are going to solve that problem.

I think it does, however, give us another platform and a way to explain why we're doing what we're doing, and also, to hear.

Very often the United States—when we send a senior official out to the region, which happens, in my view, all too infrequently, we have a lot to tell them, and we don't listen very much.

So I think the good thing about doing this multilaterally is that you get to explain why you're doing what you're doing. But you also have to listen. You have to sit there, glued to your chair, and listen to what other folks have to say.

Commissioner DREYER. So the problem is really that we go, although maybe not as often as we should, but we're not listening when we're there.

Dr. SHIRK. Well, I think that's part of the problem. I think even in our bilateral alliances there's less give-and-take than I would like to see in our practice of bilateral diplomacy, as well.

And then as to the problems of designing a structure, which would give us a more continuous presence in the region, that is a very tough problem.

I think, however, that we might look at the private sector. We have lots of examples of worldwide organizations that have figured out a way to do this and integrate operations with centers in different parts of the world.

Now, of course, the American Foreign Service and the Diplomatic Corps is that kind of system; for example, the Europe bureau of the

State Department does have more attention paid to regional affairs than the East Asia bureau does. And it's done at a higher level. And I think that that's the sort of thing that I would like to at least explore, perhaps looking at private corporate models for how to do that best.

Commissioner DREYER. Worth a try. Yeah. Dr. Krauss.

Dr. KRAUSS. Yes. I'm going to respond to your question, but just let me say something about multilateralism. I've studied the U.S. and Japanese roles in APEC particularly. And I have to say it's one thing to send people; it's quite something else for other countries to get the impression you're quite serious about multilateralism, that it's not just something you're doing or the Japanese say, "tatemae" as you know.

It's not just something you're doing because you have to, but you're not really committed to it. You really do like bilateral relations better because they advance our interests in one way.

Who pays for most of the multilateral organizations in Asia? Somebody once told me the State Department budget for APEC was \$40,000.

Commissioner DREYER. Really.

Dr. KRAUSS. Yes. Whereas, the Japanese pay for most of the multilateral activities that go on in these economic organizations. And that's a better sign to countries, I think, that Japan is quite serious and has a much higher priority on multilateral organizations in its foreign policy than we do. And I think that helps Japan, frankly, to a large extent.

Let me just answer your question a little bit. Yes. I might say that China—Chinese people are not the only people who seem to count Japan out. I believe that's a fairly common view within the beltway in the last ten years, the impression I get when I go to Washington. It's called Japan passing now. It's not Japan bashing anymore. The common wisdom in the beltway for ten years at least has been Japan passing.

We can't do anything with them. They're a declining power anyway. They're over the hill. Let's concentrate on Southeast Asia and China. That's really the impression I get of Washington's view, as well, for the last several years.

Commissioner DREYER. Well, can Japan come back?

Dr. KRAUSS. Well, there is something to what you're saying. I think there is definitely a decline of Japanese confidence in themselves as a result of 13 or 14 years of recession that seemingly never ends.

This is a country—if you have been in Japan recently, you know some of the bullet trains have painted on the side "ambitious Japan" and advertisements for young people to become more competitive and ambitious.

Just the fact that the Japanese, of all people, have to advertise to their young people to be ambitious tells you something.

And that's certainly not the Japan that I knew back in the '70s and '80s. But at the same time I think it's very easy to exaggerate this both by the Japanese themselves and in Washington and China.

Japan may be recovering right now. It's always going to be strong in some manufacturing sectors, particularly—they're far

ahead of us in telecommunication—I shouldn't say this in an area of QUALCOMM, but they're far ahead of us in telecommunications, cell phone technology, for example.

And they, I believe, will continue to be a major player in Asia, but the Japanese are quite aware that they may have to share that role. And there is going to be some competitiveness with China in the interim period.

Dr. LAMPTON. Commissioner Dreyer, on the attractiveness of the Chinese model, your question leads me in the direction of trying to refine my remark in two directions because I think it is subject to the understanding you had.

One is that people throughout Asia are attracted to the success of China.

Commissioner DREYER. Yeah.

Dr. LAMPTON. And that's what I meant by the magnetism of economic power.

Moreover, there's a subset of people that actually finds the model attractive. I was at a group meeting with some Russians the other day. It came up that the Russians found certain parts of the Chinese model attractive because they had had the same economic system as Chinese had and they're trying to get out of it still in some measures.

And also Vietnam and North Korea in a more distant future find elements of the Chinese model attractive.

So I think there is certainly a subset that actually finds the model attractive. Certainly the success is attractive.

Commissioner DREYER. Any particular features of the model that they mentioned? Anything specifically?

Dr. LAMPTON. Well, first of all, the rapidity with which the Chinese let the small and medium enterprises go, the degree to which they brought in markets, commodity markets, stock markets and so forth, the rapid introduction of labor markets. We have to distinguish between Russia and North Korea and Vietnam and so forth. But the gradualism and pragmatism where the Chinese let something happen regionally, saw what was working, and then promoted that model if it seemed to be working is attractive.

So maybe it is as much about Chinese character and pragmatism as it is anything else. You said you were skeptical, I believe was the word, about the security cooperation aspect of what I had to say. And I think at the end you said, if I understood correctly, that, well, they will cooperate in a parallel way if they see the problem the same way that we do.

Commissioner DREYER. Yeah. And we often don't.

Dr. LAMPTON. Of course. Well, that's

true—that's true among big powers per se, whether it's China or anybody else.

I would say that I think that the very thrust of Chinese development is leading them to have an array of interests that more and more frequently has them seeing the problem, if not identical to us, at least in parallel ways. That leads them for their own interests to behave in ways that are more compatible with our interests. So I don't dispute what you were saying; I just think we're in a happier stage where they are getting more interdependent in the

world. They have an interest in a broader and broader set of stable relationships that increasingly parallel our own interests.

Commissioner DREYER. Thank you.

Co-Chair ELLSWORTH. May I intervene on that point?

Commissioner DREYER. I'm done.

Co-Chair ELLSWORTH. I have been sitting here thinking ever since you asked about that.

Well, haven't they cooperated with us on the North Korea security problem? Haven't they cooperated with us on terrorism? Haven't they cooperated with us on helping resolve the India-Pakistan frictions to some extent? I'm not an expert.

Commissioner DREYER. This is for a very lengthy other conversation, not for now.

Chairman ROBINSON. Commissioner Reinsch followed by Commissioner Bartholomew.

Commissioner REINSCH. Thank you.

Thank you, all three of you, for your very sensible testimony. I hope we remember it when it comes time for us to write our report. For those of us whose minds are going, like mine, it's always a question. But since it's in writing, I'm confident we'll be able to remember it. Dr. Lampton, I thought one of the wisest things you said—well, you didn't say it. It's in your written testimony. And I would like to have you elaborate on it a little bit orally, and that's something you said at the end of your testimony in which you talked about the U.S. placing greater emphasis on economic, social and political development through institution building, talking more about development as a process, rather than simply as an end state in which there is democracy rule of law and human rights.

Could you briefly elaborate on that.

Dr. LAMPTON. Yes. I think you're always more effective when the departure point of what you're advocating for others recognizes the process through which you, yourself, have gone.

Any fair reading of American political, economic and social development would say that the last 200 years of our history has been a constant enlargement of the franchise, participation, equality and so on.

And it's also been an increasing struggle to find that balance between government intervention and innovation and individual initiative.

I don't see why the United States can't understand that when you are responsible for 22 percent of the world's population and moving part of it from literally feudal circumstances 30 years ago to something much more integrated into the world, that you're going to face problems, this is going to take time, and above all, you need institutions and rules.

Achieving this takes a lot of time because it's not just training the personnel. It's not just building a body of laws and rules. But it's actually embedding these patterns of behavior in the hearts of 22 percent of the world's people so they spontaneously behave in accordance with those rules. That's going to take time. And I don't see why we have so much difficulty incorporating that into our policy.

So all I was saying is, yes, we have these objectives. Yes, what we advocate ought to push in those directions. But, with no dis-

respect intended, we often feel much more comfortable about talking about the end state because, in fact, we don't have to put any resource into the end state.

If we start talking about building institutions and helping in that, that's going to be an expensive process. That's what we did in the Marshall Plan. We didn't just talk about the Europe we wanted; we contributed to it in a very tangible way.

So all I'm saying is, really, we need to recognize it's a long process. Rather than focusing so much on the deficiencies, let's focus on the infrastructure that makes it possible to have the world we want.

Commissioner REINSCH. Thank you for that. I think that's very helpful. Dr. Shirk, and the other two of you, feel free to comment as well, but I want to start with Susan.

Leaving Taiwan aside for the moment and looking at the region, do you think that the United States and China have fundamentally incompatible regional visions?

Dr. SHIRK. No, I don't think they're fundamentally incompatible. I don't think there are any other specific conflicts of interest, other than possibly Taiwan. The big question is what is the role of the U.S. in the region and what is the role of China in the region?

And at present, U.S. explicit policy is to prevent the rise of a peer competitor in the region. In other words, we view ourselves as the regional hegemon and that we want to remain the regional hegemon.

I think there's a very real question about whether or not that's a realistic objective, given everything else that's happened in the Asia-Pacific in the last couple of decades and is likely to happen in the future.

China, after flirting with the idea of trying to bring the U.S. down and push the U.S. out of the region militarily, which is something that they actually said, at least the academics did in the early '90s, they've completely backed away from that now.

And, in fact, one of the reasons they want to have these confidence-building measures, military ones, multilateral, as well as with the United States, is to signal to us that they no longer want to push us out of the region militarily, that they can live with the continued military presence of the United States and they're willing to work with that, to cooperate with that. Mike Lampton talked about the kind of adjustments that are really required by the rise of China and by the other changes in the region. And I think one of those is to recognize that in the future, the way for us to maintain our leadership in the region is by sharing the responsibility for the management of the region with other powers, meaning China, meaning Japan, meaning Russia, meaning ASEAN. So it's not something that we can do alone anymore.

Commissioner REINSCH. Do either of the other two of you want to comment on that?

Dr. KRAUSS. Just to point out a long-term historical perspective.

I'm always struck by the fact that if you look at U.S.-East Asian history, there are very few—very short periods and very few of them where the United States did not somehow feel the necessity to have one friend and one enemy between Japan and China. They've always reversed roles somehow over different time periods.

And I think that's a very—I mean, if we do that again—I just want to warn against doing that again. Obviously, clearly, Japan is our friend, at least on security matters. It's our rival in many ways, as well as our partner on economic matters. I think we have to be very careful of the danger, that we don't demonize China, once again, to make sure that we have one friend and one enemy or rival in China.

I think the challenge for American diplomacy in East Asia in the future is going to be balancing these two people who or can be potentially our friends and certainly they are our economic partners even while they're rivals in other ways.

Dr. LAMPTON. I thought that was a really terrific question. I think it frames the anxieties.

What is China's ultimate goal? To get us out of Asia is one formulation.

I would say no, it isn't. I agree with everything Susan said. I would just make two points.

One is, China doesn't want to be left alone in Asia with Japan any more than Japan wants to be left alone in Asia with China. So that's the first point. Secondly, the Chinese learned a central

lesson from the collapse of the Soviet Union, and that is, the basis of comprehensive national power is a vibrant domestic economy, not a defense structure into which you are pouring endless amounts of money at the cost of your domestic human and technological resources.

And so the last thing they want to do is to pay all the freight protecting oil shipments to China through the Straits of Malacca or anywhere else.

I think they're rapidly coming to the conclusion that a shared security burden is the course most compatible with their continued economic growth.

What they don't want however is a U.S. that's trying to, as they would put it, separate Taiwan or contain China. And as long as they conclude that's not our principal purpose, I think they want us there.

Commissioner REINSCH. Thank you.

Chairman ROBINSON. Commissioner Bartholomew followed by Commissioner Becker.

Commissioner BARTHOLOMEW. Thanks very much. And thanks, again, to all of our witnesses and everyone who hosted us here. It's been really wonderful.

I'll start just with a brief comment since Commissioner Reinsch raised the issue, which I think is important to remember that U.S. support for human rights and democratic reform in China is the U.S. supporting the hopes and aspirations of the Chinese people whose own government is responsible for denying them basic freedoms—freedoms that are enshrined in the Chinese constitution and international obligation. To me, that's a very important part of the framework.

I have a rhetorical question more than anything else, and then a couple of specific questions. My rhetorical question relates to the Chinese currency revaluation issue. I guess I would just say is it not possible, perhaps even likely, that the Chinese could time their revaluation to have an impact on the U.S. presidential election?

I'm not sure anybody really wants to take that on, but if you have thoughts about that, it would be interesting.

Dr. Lampton, I was interested in your remark on sanctions about the 85 cents cost out of a dollar. My comment there would only be that that presupposes that there isn't somewhere else that the production could be done.

And it's my understanding that during SARS last year, in fact, a number of textile manufacturers were looking at the possibility of having to transfer production to Vietnam or to some other places. It's not without cost, but it is indeed possible. I just wanted to put that out. But my question specifically, Dr. Lampton, is actually about your comments on the war against terrorism. I was really struck by what Dr. Shirk said about that—that in the Chinese mind, terrorists, separatists and extremists are all the same, which is, of course, a code word for the Uighurs, the Tibetans, and the Taiwanese. And we hear a lot about how the Chinese are cooperating on the war on terrorism. I wonder if you could give us some specifics about something other than them using the war against terrorism as an excuse to crack down on the Uighurs.

Dr. LAMPTON. You mean give other—

Commissioner BARTHOLOMEW. Yes. Well, what are some examples of how specifically they're cooperating with the U.S. in the war against terrorism?

Dr. LAMPTON. I will do so. I would also invite you at some point to have people from the National Security Council and so forth testify to this. They're privy to more information, and they, I think, in general, would be more useful to you in answering the question than I.

But several things come to mind. One is the Container Security Initiative at the Commerce Department, and I just spoke with Secretary Evans not very long ago. As I would understand it, there are 20 ports around the world that have the biggest volumes of containers coming to the United States.

The United States has asked China to station in these ports U.S. personnel to pre-inspect those containers and assure they don't have weapons of mass destruction.

Many of us that have studied Chinese history thought, when we first heard the idea of putting U.S. FBI or Customs deputies in Chinese ports—that, the Chinese would filter this through the treaty port mentality and reject it out of hand.

In fact, they have not. They have been cooperative. The ports involved are Hong Kong, Shenzhen, and also Shanghai. And so the Chinese have been remarkably cooperative on that given what we might have expected given their framework. Commissioner Ellsworth pointed to several very important things in his dialogue with Commissioner Dreyer. And that is that India and Pakistan; you may remember in the summer of 2002 we were afraid they might end up in a nuclear imbroglio.

The Chinese on several occasions were publicly praised by the United States for tamping that down, particularly given their influence with the Pakistanis.

Also, right at the very beginning of our intervention in Afghanistan, remember we were concerned about whether or not Pakistan

would cooperate with us. Musharraf spoke with the Chinese leadership personally on two occasions.

And I have been told by the U.S. Government that, in fact, the Chinese encouraged their long-time ally to cooperate with the United States. So I think that's an area.

Certainly on the war on terror, if you look at the UN issue with respect to intervention in Iraq and so forth, although the Chinese were not enthusiastic, they found a way to avoid taking a public position such as the Russians and the French and the Germans took against us. Nothing in this testimony nor nothing that I believe would suggest that they're central to the war on terror, but I think everyone would agree we're better off with them in the tent than outside the tent.

Commissioner BARTHOLOMEW. Okay. Anyone else on that one? No.

Dr. Shirk, I know you focused on regional multilateral. But if we look more globally in terms of China's participation in multilateral organizations, I wondered what your thoughts are as to how their participation might be changing the nature of the multilateral organizations.

Two issues come to mind. Of course, one is there had been concern with China's succession to the WTO and its lack of willingness prior to that to play by global rules. What impact it was going to have on the WTO. And the other one, which always comes to mind for me, is the UN Human Rights Commission where they influence by, I think, is what I would call, which is change the ability of that organization to function. Just any thoughts you have on that?

Dr. SHIRK. On the Human Rights Commission, I—I believe that the U.S. is getting less and less traction on the Human Rights Commission for its positions, but I don't really know enough to say whether or not that's because of major mobilizational efforts that the Chinese have undertaken.

Commissioner BARTHOLOMEW. They generally start the day after Geneva.

Dr. SHIRK. Yeah, I know. Clearly, they have resented our resolutions against them. And they seem to care a lot about the normative opprobrium of the Commission, and they work hard to defeat it. But it's not clear to me. If China were not doing that, would we, other than the China resolution, be getting more support on the Human Rights Commission? So I don't know whether or not that's actually changed the functioning of that Commission.

On the WTO I think what's very interesting is how the Chinese have committed themselves to working in the WTO organization and seem to be largely supportive of the initiatives of the United States and the West in carrying forward and having a second round that really goes somewhere.

They have mixed incentives because they are both an agricultural exporter, as well as an importer, and their agricultural sector is under a lot of pressure because of opening up the market for agricultural products.

So I think they kind of straddle the views of the countries like the United States and Australia and Canada that are major agricultural exporters and the ones who have very protected agricultural sectors. So, you know, China does try to speak for the devel-

oping world, but it does it in a much less ideological way than it used to. And it is more willing to cooperate with the United States and other trading powers in the WTO than a country like India, say.

I think that it's a little early to say how it's going to go yet. But so far China appears to be a constructive player and not a spoiler within the WTO.

Dr. KRAUSS. Let me just add to that the history of Japan in multilateral organizations like GATT and the WTO is very instructive. Japan distrusted the WTO as nothing more than a front for American pressure essentially until it won a few cases, whereupon it has become extremely aggressive against all of its trade partners, against its trade partners in using WTO, including, as we were talking about that before, privately, challenging the 1916 steel law in the United States and winning and winning several cases. Now, that's a double-edged sword because it means you could use it against your trading partners when it suits your interests, but it also means you have to abide by the rules when you lose. And, I wouldn't be surprised if we see a similar trajectory with China.

Dr. SHIRK. I agree—if I just may interject, one point is that there are all these antidumping cases all over the world, national ones against China.

And I think that China is likely to use the WTO in the future to try to counteract that kind of reaction from particular nations.

Chairman ROBINSON. Thank you.

Commissioner Becker followed by some concluding remarks by Commissioner Ellsworth.

Commissioner BECKER. Thank you very much, Mr. Chairman.

I want to compliment the committee on the testimony that presented. I'm somewhat taken by the fact that there's a high degree of similarity between each one of you on both your analysis of the problem and the suggestions and solutions.

My colleagues have covered everything that I could think of except one thing. It's the old story, everybody said everything that there is to say, but not everybody said it yet.

This is a question I've carried around for a long time, waiting for the right committee or the right panelist to ask. It's a little bit out of line of what we've discussed here. Dr. Shirk, when you said China has backed away from trying to oust the United States, at least in an influential position and probably a military position from Asia, I would suggest that they may have backed away, but not necessarily forgotten it. I think that's just a subtle difference in the perspective.

And a comment to Dr. Lampton. I've really enjoyed your discussion on the different types of power—diplomatic and economic and military power. We had a saying in the labor movement for a long time that there's no sense in having power if you don't use it. And I think that's a doctrine that a lot of countries adopt too.

When you don't have the power, you use diplomatic arguments and maybe even economic, but when you have the power, the playing field changes a lot as the direction is going.

I want to draw two points. When I said that's similar in your testimony, it really is.

Dr. Shirk says on the first page about the Chinese, it's a credible signal of China's peaceful intentions or a Bismarckian strategy to grow stronger without provoking others to combine against it. And this goes back to the sense of power and the possibility of using it. But you don't dismiss the possibility of them using the power, not at all.

And Dr. Krauss talks about preventing a China-Japan arms race and conflict that would destabilize the entire region.

So you, too, don't dismiss the possibility of a conflict in that region.

And you've alluded to it, Dr. Lampton, in several different ways. I don't want to dwell on that, but I want to raise this question. United States business and other countries have invested billions of dollars into China. Some companies have transferred their whole business operation to China.

I often wonder in my mind at what point in time an American company becomes a Chinese company. But their whole operation is gone from the United States, and they're wholly invested in China. Others are partial. Some are in transition, like Motorola, which is the strongest, biggest investor in China, but more and more—literally billions of dollars of investment from Motorola, and they're in a constant stage of shutting down plants in the United States and moving over there. I guess my question is, China is a communist nation. At times their behavior has been erratic and heavily authoritarian. And I'm not talking about historic memories. I'm talking about recent years. I point to Tibet. I point to Tiananmen Square. I talk to the EP 3 incident and certainly Taiwan. And the provocative position that they've taken often, including the firing of missiles close to the island in a very provocative way, building additional missiles and lining the coast with them in what can only be interpreted by the Taiwanese and the United States as their ally in a provocative way. We have other allies in the east that we're closely aligned obviously to South Korea and Japan. So we have a vested interest in this whole thing.

But for these American industries that have invested in China so heavily in varying degrees, do you perceive any kind of threat to these industries that have taken this bold step and put all their eggs in one basket in China?

How would you assess that yourselves?

Dr. SHIRK. I think there's a lot of risk to investing in China. Not necessarily the risk of expropriation—expropriation that you might have to worry about in all developing countries, but the risk of a political internal conflict in China.

I think the challenge of taking China from communist authoritarian country to a democracy peacefully is just a daunting challenge and that it's most likely to be peaceful if that transition is led from above by a reformist communist leadership. And I'm actually quite discouraged that the pace of political reform has not kept up with the pace of economic reform, and that we've all had quite high expectations of this younger leadership team, Hu Jintao and Wen Jiabao. My friends in China are also concerned that this seems to be moving so slowly.

So I think there's a serious risk of domestic political conflict in China that is a major security risk to the United States and cer-

tainly a risk for all the companies that are doing business in China.

Commissioner BECKER. Thank you. Dr. Krauss.

Dr. KRAUSS. Let me just assure George that any similarities in our testimony or reports are purely coincidental. I never met Mike before. And Susan and I are so busy, I don't think we've ever talked about this previously. So—

Vice Chairman D'AMATO. It's the great minds thing.

Dr. KRAUSS. Thank you. I'm glad you said it.

Commissioner BECKER. I don't believe in coincidence.

Dr. KRAUSS. In fact, I was shocked to learn that there was a "San Diego line". I had no idea. In any event, on the China-Japan rivalry, I think a lot depends on keeping the U.S.-Japan relationship strong as to whether or not that rivalry gets out of control.

The worst thing in the world that could happen to the United States and Asia is for Japan to lose faith in the United States, develop its own independent military power and an arms race to ensue in Asia between China and Japan.

I think it's very important to keep the U.S.-Japan relationship strong. The dilemma for the United States will be doing that while not provoking China and convincing it that it's all aimed at China because, then, this is the line we are going to have to straddle in the future.

That's, I think, very important. So a lot of us—a lot depends on us, frankly; it's not just China and Japan.

The other thing is about the threat in China. Japanese business has a little different attitude than American business. And that is, despite all the investment in FDI and Japanese government, they believe that the way to compete with China is to keep yourself competitive and go higher and higher quicker and quicker in terms of going up the value-added chain and stay one step ahead of the Chinese.

And they've been very careful not to—in their investments in China not to transfer technology—advanced technology. Whereas, back in the '70s and '80s American businesses sold the store to Japanese companies in terms of technology transfer. And we learned too late that that was not a good idea.

So I think a lot of the responsibility, again, is on American businesses to invest in China, carefully calculate the risks, and that includes the risks of giving too much away in those investments even while we make sure they're productive. And, again, I don't think any of us here disagree that human rights in China and the opening up of China democratically is a crucial issue for the future and very—a lot depends on that.

I just think that we have different views. The Japanese don't believe in pressure, and they don't believe in the, as I said, military deterrence particularly yet.

They do believe that if China develops economically long term, it will inevitably become more liberal and more democratic.

I'm always—I find that ironic because there is an example in the world of a country that did develop very quickly economically and didn't exactly become democratic without some foreign imposition, and that was, of course, Japan in the 1930s and the '40s.

But that is their view. Other people think pressure is going to do it. Some people find that counterproductive. And then there's working to build multilateral and other institutions to expand the rule of law.

Now, I think it's a question of the means. We're all agreed on the goals here. And there is trade-offs on each of those means.

Dr. LAMPTON. I think your question, Commissioner, was very good. And I know that we have to conclude, but I do have three quick points here.

One is that, yes, we're investing a lot of dollars in China, but I think I heard the figure yesterday, it's still only 1 percent of total U.S. FDI.

So, if we look at total holdings of foreign direct investment, it's still a modest percentage of our total.

Secondly, you asked what risks do I see.

And I certainly see a lot. But I think the impact of what we've heard the last two days is that China is becoming the last point in a lot of very strategic production chains, whether it's computers or many other things. And obviously if there was disruption either in terms of foreign relations or domestically in China—and I share Dr. Shirk's concerns about that—that could be extremely disruptive to the entire world financial and economic system. I think that's a huge risk.

Then the final thing, and this is sort of policy implications—is, how should the United States think about dealing with the risks we all agree are inherent in China's rise? And there are several of things. First of all, we've got to keep our relations with the rest of the countries in Asia in good order. In other words, we've got to have good diplomatic relations and economic relations with everybody in Asia and not just China. Secondly, we have to keep our military capabilities in sound order there. I certainly think we need to do that. And I would agree with Dr. Krauss about the centrality of the U.S.-Japan Alliance just as a sort of baseline to depart from.

Thirdly, I think all of our companies—I hope they are—are diversifying production to some extent. You don't put all your eggs in one basket. We ought to attach some value to diversifying our production sites, even if we place the most emphasis on some industries in China.

And, finally, I just would end where I think the whole logic of these two days has brought us and that is, ultimately we've got to keep our technological lead. And that means start with primary school and start educating our kids. I know I'm in higher education, but if I took any dollars and put them in education, I would start at the bottom of the chain, not at the top.

Chairman ROBINSON. Well, thank you for that remark. And I would like to turn the proceedings over to cochairman of this field investigation, Ambassador Ellsworth, for some comments.

Co-Chair ELLSWORTH. Thank you, Mr. Chairman.

Just before I make my final comments, I want to take the opportunity to introduce to you and my fellow Commissioners a very distinguished visitor who is sitting in the front row over here. For many years he was the very distinguished and able president of the Chicago Council on Foreign Relations. He now comes out here to

UCSD once a year, and does some work as an associate professor, Mr. John Riley.

John, wouldn't you stand up so that we can recognize you and welcome you.

Well, it seems to me, sitting here thinking about these days of dialogue and reflection on China at the behest of the Congress. The Congress in creating this Commission signaled that they wanted to understand China more deeply and more comprehensively than they had before. And as a former member of Congress, I can say I think they needed it. And, I think that we can help them with that.

We live in a world in which the United States is the most powerful nation in the history of the world in almost any dimension that you can imagine.

And yet, we're going through and experiencing in our age change of totally unprecedented speed and depth. If you think about it, you can prove that to yourself in about 15 seconds of reflection.

So it's a kaleidoscope and it's revolving very rapidly. And you here at UCSD, with your brains and your study and your scholarship and your involvement—think about Susan Shirk and her Track 2 involvement in the world. It's very—been very helpful to us.

And I, for one, am most grateful and glad that you did respond to our request for help in such a very, very strong and helpful way.

Chairman ROBINSON. Thank you, Ambassador Ellsworth.

And while I would certainly second those remarks and in concluding these proceedings, the Commission would be remiss if it didn't express its appreciation and recognize several people from the University of California at San Diego, its Graduate School of International Relations and Pacific Studies, so-called IRPS, who were instrumental in making the Commission's second field investigation what I think we'd all agree is a success.

They did an outstanding job. They worked long hours to provide the logistic support and program support that enabled us to conduct this important event.

And so with that, special thanks and appreciation for a job well done goes to, first and foremost, to IRPS Dean Peter Cowhey; Dr. Susan Shirk, again, who is the professor of political science; Portia Bibb, IRPS director extraordinaire, who did a magnificent job organizing this event; Olivia Knight; Barry Tradorda; USD—UCSD press and director of communications, Howard Lawrence; media services and video conference, Shannon Bradley; and the excellent team of technicians and operators from UCTV; Julia Engstrom, director of catering and her excellent team; and Emily Maxim, facility coordinator for the Great Hall here, which has been a delight to spend two days in, I can assure you. And a special thanks to my U.S.-China

Commission staff, as well, for their excellent work; Carmen Arleth Zagursky, who did an outstanding job in preparing the briefing book for today's and yesterday's field investigation; my public affairs director and special advisor, Bob Bean; and, of course, David Ohrenstein, who had to fly back a little early, who is our executive director. So a job well done to our team, as well.

And with that, I would like to declare the second U.S.-China Economic and Security Review Commission Field Investigation closed and with great thanks.

(End of proceedings.)

**STATUTORY MANDATE OF THE U.S.-CHINA ECONOMIC AND SECURITY
REVIEW COMMISSION**

Pursuant to Public Law 108-7, Division P, enacted February 20, 2003

RESPONSIBILITIES OF THE COMMISSION.—The United States-China Commission shall focus, in lieu of any other areas of work or study, on the following:

PROLIFERATION PRACTICES.—The Commission shall analyze and assess the Chinese role in the proliferation of weapons of mass destruction and other weapons (including dual use technologies) to terrorist-sponsoring states, and suggest possible steps which the United States might take, including economic sanctions, to encourage the Chinese to stop such practices.

ECONOMIC REFORMS AND UNITED STATES ECONOMIC TRANSFERS.—The Commission shall analyze and assess the qualitative and quantitative nature of the shift of United States production activities to China, including the relocation of high-technology, manufacturing, and R&D facilities; the impact of these transfers on United States national security, including political influence by the Chinese Government over American firms, dependence of the United States national security industrial base on Chinese imports, the adequacy of United States export control laws, and the effect of these transfers on United States economic security, employment, and the standard of living of the American people; analyze China's national budget and assess China's fiscal strength to address internal instability problems and assess the likelihood of externalization of such problems.

ENERGY.—The Commission shall evaluate and assess how China's large and growing economy will impact upon world energy supplies and the role the United States can play, including joint R&D efforts and technological assistance, in influencing China's energy policy.

UNITED STATES CAPITAL MARKETS.—The Commission shall evaluate the extent of Chinese access to, and use of United States capital markets, and whether the existing disclosure and transparency rules are adequate to identify Chinese companies which are active in United States markets and are also engaged in proliferation activities or other activities harmful to United States security interests.

CORPORATE REPORTING.—The Commission shall assess United States trade and investment relationship with China, including the need for corporate reporting on United States investments in China and incentives that China may be offering to United States corporations to relocate production and R&D to China.

REGIONAL ECONOMIC AND SECURITY IMPACTS.—The Commission shall assess the extent of China’s “hollowing-out” of Asian manufacturing economies, and the impact on United States economic and security interests in the region; review the triangular economic and security relationship among the United States, Taipei and Beijing, including Beijing’s military modernization and force deployments aimed at Taipei, and the adequacy of United States executive branch coordination and consultation with Congress on United States arms sales and defense relationship with Taipei.

UNITED STATES-CHINA BILATERAL PROGRAMS.—The Commission shall assess science and technology programs to evaluate if the United States is developing an adequate coordinating mechanism with appropriate review by the intelligence community with Congress; assess the degree of non-compliance by China and [with] United States-China agreements on prison labor imports and intellectual property rights; evaluate United States enforcement policies; and recommend what new measures the United States Government might take to strengthen our laws and enforcement activities and to encourage compliance by the Chinese.

WORLD TRADE ORGANIZATION COMPLIANCE.—The Commission shall review China’s record of compliance to date with its accession agreement to the WTO, and explore what incentives and policy initiatives should be pursued to promote further compliance by China.

MEDIA CONTROL.—The Commission shall evaluate Chinese government efforts to influence and control perceptions of the United States and its policies through the internet, the Chinese print and electronic media, and Chinese internal propaganda.

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