CHINA'S FIVE-YEAR PLAN, INDIGENOUS INNOVATION AND TECHNOLOGY TRANSFERS AND OUTSOURCING

HEARING

BEFORE THE

U.S.-CHINA ECONOMIC AND SECURITY

REVIEW COMMISSION

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

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JUNE 15, 2011

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WASHINGTON : 2011

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U.S.-CHINA ECONOMIC & SECURITY REVIEW COMMISSION

June 22, 2011

The Honorable Daniel Inouye
President Pro Tempore of the Senate, Washington, D.C. 20510
The Honorable John A. Boehner
Speaker of the House of Representatives, Washington, D.C. 20515

DEAR SENATOR INOUYE AND SPEAKER BOEHNER:

We are pleased to notify you of our June 15, 2011 public hearing on *"China's Five-Year Plan, Indigenous Innovation and Technology Transfers, and Outsourcing."* The Floyd D. Spence National Defense Authorization Act (amended by Pub. L. No. 109-108, section 635(a)) provides the basis for this hearing.

At the hearing, the Commissioners heard from the following witnesses: Dr. Willy C. Shih, Dr. Eswar Prasad, Dr. Adam Segal, Mr. John Neuffer, Dr. Dieter Ernst, Dr. Ralph E. Gomory, Mr. Leo Hindery, and Dr. Philip I. Levy. The subjects covered included China's 12th Five-Year Plan, indigenous innovation and other industrial policies, and technology development and transfers to China, and the implications of such policies for the United States.

We note that the full transcript of the hearing will be posted to the Commission's website when completed. The prepared statements and supporting documents submitted by the participants are now posted on the Commission's website at www.uscc.gov. Members and the staff of the Commission are available to provide more detailed briefings. We hope these materials will be helpful to the Congress as it continues its assessment of U.S.-China relations and their impact on U.S. security.

The Commission will examine in greater depth these issues, and the other issues enumerated in its statutory mandate, in its 2011 Annual Report that will be submitted to Congress in November 2011. Should you have any questions regarding this hearing or any other issue related to China, please do not hesitate to have your staff contact our Congressional Liaison, Jonathan Weston, at 202-624-1487 or jweston@uscc.gov.

Sincerely yours,

William A. Reinsch
Chairman

Daniel M. Slane
Vice Chairman

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WEDNESDAY, JUNE 15, 2011

CHINA'S FIVE-YEAR PLAN, INDIGENOUS INNOVATION AND TECHNOLOGY TRANSFERS AND OUTSOURCING

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

CHINA'S FIVE-YEAR PLAN, INDIGENOUS INNOVATION AND TECHNOLOGY TRANSFERS, AND OUTSOURCING

WEDNESDAY, JUNE 15, 2011

U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION

Washington, D.C.

The Commission met in Room 216 Hart Senate Office Building, Washington, D.C. at 9:22 a.m., Chairman William A. Reinsch, and Vice Chairman Daniel M. Slane and Patrick A. Mulloy (Hearing Co-Chairs), presiding.

OPENING STATEMENT OF COMMISSIONER PATRICK A. MULLOY HEARING CO-CHAIR

HEARING CO-CHAIR MULLOY: Good morning and thank you coming to today's hearing.

In this hearing, the Commission will examine China's new Five-Year Plan, its indigenous innovation and technology transfer policies and the impact this has on outsourcing of U.S. jobs to China. It is the eighth and final hearing of this reporting cycle for the Commission.

For those that are new to our hearings, the U.S.-China Economic and Security Review Commission is a bipartisan congressionally chartered Commission composed of 12 members, six of whom are selected by the Majority and Minority leaders of the Senate and six by the Speaker and Minority Leader of the House.

The Commission was established by Congress in 2000 to review the National Security implications of trade and economic ties between the

United States and the People's Republic of China.

The Commission has a broad-ranging mandate that includes examining other aspects of the U.S.-China relationship such as China's growing military and political power.

The Commission's charter specifically charges it to, quote, "analyze the qualitative and quantitative nature of the transfer of U.S. production activities to the People's Republic of China, including the relocation of high technology, manufacturing, and research and development facilities, the impact of such transfers on U.S. national security, the adequacy of U.S. export control laws, and the effect of such transfers on the United States economic security and employment."

Pursuant to that latter provision of our charter, today's hearing is going to focus on key facets of China's industrial policies, their impact on American companies, and the impact on job creation in the United States, and how they stimulate outsourcing of U.S. jobs to China.

Since 1953, the Communist Party of China has used a series of Five-Year Plans to guide China's economic and social development. In its newly adopted 12th Five-Year Plan, China makes clear that it hopes to move up the manufacturing value chain by making explicit mention of strategic emerging industries which the Chinese government would like to see dominated by Chinese firms.

China's goal is to take the strategic emerging industries from a current combined share of three percent of Chinese GDP to eight percent by 2015 and 15 percent by 2020.

One of the tools that the Chinese government will use to grow these strategic emerging industries is a policy of indigenous innovation. This policy seeks to help China move up the value-added chain. Indigenous innovation policies have drawn criticism from U.S. and European business leaders and U.S. and EU policymakers because China makes use of this policy to require foreign companies to transfer their higher technologies and know-how as a condition of doing business in China or to get government procurement contracts in China.

China is doing this despite the fact that in joining the WTO in 2001, it agreed to eliminate forced technology transfers. China claims it is not violating that commitment because the decisions being made by the U.S. and other foreign companies to transfer technology for market access are purely business decisions made by individual companies.

These individual company decisions, however, can have a deleterious impact on the U.S. economy. These are very important issues, and we have excellent witnesses to help us shed some light on them and to consider possible solutions that we can recommend to the Congress.

I would like to remind members of the audience and people who may be watching on the stream through their computers, that all of the written

statements submitted for the record are available on our Web site. That Web site is www.uscc.gov. A transcript of today's hearing will also be published on our Web site at a later date.

I now turn to Dan Slane. Dan is the Vice Chair of the Commission and my Co-Chair for this hearing, and it's really been a pleasure to work with him in putting this hearing together today with our able staff.

Thank you.

[The written statement follows:]

PREPARED STATEMENT OF COMMISSIONER PATRICK A. MULLOY HEARING CO-CHAIR

Good morning and thank you for coming to today's hearing. In this hearing the Commission will examine "China's New Five Year Plan, Indigenous Innovation and Technology Transfers, and Outsourcing." It is the eighth and final hearing of this reporting cycle.

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The Commission's charter specifically charges it, among other things, to analyze "the qualitative and quantitative nature of the transfer of United States production activities to the People's Republic of China, including the relocation of high technology, manufacturing, and research and development facilities, the impact of such transfers on United States national security, the adequacy of United States export control laws, and the effect of such transfers on United States economic security and employment."

Pursuant to that latter provision, today's hearing will examine key facets of China's industrial policies, their impact on industries and job creation in the United States, and the outsourcing of jobs to China. Since 1953, the Communist Party of China has used a series of five-year plans to guide China's economic and social development. In its newly-adopted 12th Five-Year Plan China makes clear that it hopes to move up the manufacturing value chain by making explicit mention of Strategic Emerging Industries, which the Chinese government would like to see dominated by Chinese firms. These industries are: New-generation information technology, high-end equipment manufacturing, advanced materials, alternative-fuel cars, energy conservation and environmental protection, alternative energy, and biotechnology. China's goal is to take the Strategic Emerging Industries from a current combined share of 3% of Chinese GDP to 8% by 2015 and 15% by 2020.

One of the tools the Chinese government will use to grow these Strategic Emerging Industries is indigenous innovation. This policy seeks to help China move up the value-added chain. Indigenous innovation policies have drawn criticism from the U.S. and European business communities and policy makers because China uses this policy to require foreign companies to transfer their higher technologies and know-how as a condition of doing business in China or getting government procurement contracts in China.

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These are very important issues, and we have excellent witnesses today to help up shed some light on them, and to consider possible solutions. I would like to remind the members of our audience that all of the written statements submitted for the record are available on our website, www.uscc.gov. A transcript of today's hearing also will be published on our website at a later date.

OPENING REMARKS OF VICE CHAIRMAN DANIEL M. SLANE HEARING CO-CHAIR

VICE CHAIRMAN SLANE: Thanks. On behalf of Commissioner Mulloy and myself, we wanted to express our thanks to our great staff who put this hearing today, especially Paul Magnusson, Jonathan Weston, Nargiza Salidjanova and Mike Danis. Thank you very much.

PANEL I: CHINA'S 12TH FIVE-YEAR PLAN

HEARING CO-CHAIR MULLOY: Now, our first panel, Dr. Eswar Prasad and Dr. Willy Shih. Dr. Eswar Prasad is the Tolani Senior Professor of Trade Policy at Cornell University in Ithaca, New York.

He's also a Senior Fellow at the Brookings Institution, where he holds the New Century Chair in International Economics, and a Research Associate at the National Bureau of Economic Research. He was previously Chief of Financial Studies Division at the International Monetary Fund Research Department, and before that he was the head of the IMF's China Division.

Dr. Willy Shih is a Professor of Management Practice at the Harvard Business School in Boston, Massachusetts. He teaches Technology and Operations Management in the first year required curriculum, as well as Building and Sustaining a Successful Enterprise in the second year elective curriculum.

Prior to joining the Harvard Business School, Dr. Shih spent 18 years in the computer industry, mostly in product development. He subsequently managed Digital Equipment Corporation's Alpha microprocessor-based engineering workstation business and its Windows NT and UNIX marketing divisions. This was followed by a stint at Silicon Graphics Computer Systems.

We're very fortunate to have men like this come and help us think through these issues. I think it would be best to start with Dr. Eswar Prasad. Could you give us the larger vision of the Five-Year Plan? And then Dr. Shih, you focus on the strategic emerging industries.

So, Dr. Prasad.

STATEMENT OF DR. ESWAR PRASAD
TOLANI SENIOR PROFESSOR OF TRADE POLICY
CORNELL UNIVERSITY, ITHACA, NEW YORK AND
SENIOR FELLOW AND NEW CENTURY CHAIR IN INTERNATIONAL ECONOMICS
BROOKINGS INSTITUTION, WASHINGTON, DC

DR. PRASAD: Thank you very much, Chairman Reinsch, Vice Chairman Slane, Commissioner Mulloy and other Commissioners.

It's a pleasure, as always, to testify before your Commission. It's an especial pleasure because before your Commission I'm more often listened to rather than spoken to. So it's very nice to be here.

I'm going to talk largely about the broad vision outlined in the 12th Five-Year Plan put out by the Chinese government and ratified by the National People's Congress about three months ago, and that document needs to be read in conjunction with Premier Wen Jiabao's speech or report to the National People's Congress.

There are two distinct parts to these documents. One is a set of short-term objectives. The second is a set of medium-term objectives. What is remarkable about the document overall, especially for those of us who are in Washington and see a denial on some of these issues, is the very frontal assessment of what the challenges are that the Chinese economy faces in the short-term and the medium-term.

Of course, within the Chinese Communist Party and more broadly in China, there isn't necessarily a consensus on what is the appropriate diagnosis of what causes the problems or what the solutions are to be, but it is really a laying forth of the key challenges that the economy faces.

The document started by talking about the short-term policy challenges that the economy faces, and the focus there really is on inflation. The reason the Chinese government is very concerned about inflation, of course, is that with CPI inflation now higher than five percent and edging a little higher by the day, there is a real concern about the implications for social instability.

Why? Largely because in China, food expenditures still account for about one-third of overall consumption expenditures of households and an even larger fraction for poorer households. In particular, the urban poor are hit by food price increases because they don't get the benefit of agricultural price increases, and, in fact, social instability in urban areas, which is already simmering to some extent because of the growing gap between rich and poor, is a very serious concern.

And it is, in fact, in dealing with the short-term issue of inflation that the plan is very, very specific about the policy measures that are being taken, both in terms of the monetary policy front and also in terms of administrative measures to control prices.

The medium-term objectives of the plan are also very ambitious at one level. What the document sets out to do is basically lay out a vision whereby China can change its growth model and essentially get much more balanced growth in three dimensions--social, economic and environmental. And all of these are seen as very important for China's future growth as well as stability.

One of the key aspects of this rebalancing approach is basically to shift away from an investment-led growth model. Now, there is a notion that China is very dependent on exports for its growth. It turns out that, in fact, over half of GDP over the last decade has come from investment growth, and in fact during the worst years of the financial crisis, 2008 and 2009, what kept the Chinese economy afloat was to some extent fiscal stimulus, but to a much greater extent bank financed investment.

In fact, investment surged in 2009. It was what largely kept China and one might argue some parts of the rest of the world economy afloat as well. What they're trying to do is shift away from this because ultimately this sort of growth does not deliver what the Chinese Communist Party needs for its legitimacy on economic and social fronts. It does not deliver employment growth because it's largely physical capital-led growth. It does not deliver equity, and it's led to a declining share of labor income and national income, a declining share of personal disposable income in GDP.

One might argue that if an economy is growing at ten percent a year, perhaps it doesn't matter as much if not all of these benefits go to the average household. But it does suggest that there are significant efficiency losses in the growth process in China, and, of course, the physical capital investment-led growth strategy also has very destructive environmental consequences which the government is very cognizant about.

So how do they plan to deal with these issues? One is to emphasize a key set of reform priorities including improving the social safety nets in the hope that this will, to some extent, lead Chinese households to not increase their saving rates at such a high rate and perhaps rely on the social safety net and thereby increase their consumption more.

In addition, financial market development, essentially undertaking banking sector reforms but also broadening financial markets, to include corporate bond development so that there is a much more balanced financial system.

But one of the disappointments in the 12th Five-Year Plan was there was very little mention of one priority, which based on the statements of Chinese officials had been anticipated, which is interest rate liberalization, which I think is really critical, both in terms of the overall financial reform process, as well as in terms of trying to rebalance growth.

In addition, the report also talks about in a very pro forma way about improving the formation of the exchange rate mechanism and opening of the

capital accounts a lot more. And now these are very pro forma statements in the sense that these have been around for awhile, and there doesn't seem to be a recognition that especially in terms of the currency, there could be significant gains from using the currency as a tool, not only in this rebalancing process, but also in terms of the short-term policy of trying to deal with the inflation problem.

China is moving forward towards increasing its capital account openness. This is happening de facto, and what the Chinese are trying to do is basically control the process and use it to their advantage, which is a sensible approach because they don't want to throw open the capital account completely, given that the financial markets are not fully developed, but at the same time, they do want the renminbi, or the yuan, to become much more used internationally, and thereby start getting the benefits of having China having an important global currency.

So all of these policies ultimately are heading in the right direction. One other important set of policies, which your hearing today is focusing on, of course, is related to industrial policy, and I know we'll discuss this a great more during the day, but there are two important aspects to it.

One is upgrading the traditional industries, and the plan identifies a very specific set of industries which China has been pushing for many years and where there is a sense that those industries are somewhat backsliding.

So the strategy there is to upgrade those industries and, in addition, to consolidate them in order to increase efficiency and productivity gains.

And the second issue is to try to move forward aggressively, as Chairman Mulloy mentioned, in terms of pushing forward into new industries which have a high tech and environmental focus. Now this by itself is not necessarily a bad thing. In fact, I think it's a sensible approach from China's point of view.

But two things to keep an eye out for are whether this approach, this broad industrial policy approach, is going to lead to a backsliding of the move towards a more market-oriented economy because when one hears words like "consolidation," there is a concern that this could start shifting some power back to the state sector, and, in addition, the question is whether the idea of encouraging the new industries could morph into a form of either implicit or explicit subsidies that could end in creating a less than level playing field or perhaps even running afoul of WTO obligations.

So the plan overall is a sensible document, but there are some interesting issues that it brings up. Like I said, the first is that there is much more in terms of specificity about short-term policies. The long-term goals are really aspirations. There are some policies that are laid out in terms of broad sketches, but there is much less specificity about those medium-term policies.

Another interesting thing is a very clear and resounding signal that is

sent in the document to local governments that growth should not be the end all of the development process. In fact, the document very clearly admonishes state governments not to keep going for growth at all costs and instead look at a broader set of social and economic indicators to evaluate economic progress.

And then there is an interesting set of tensions between the short-term objectives and the long-term goals of the plan. Let me give you two examples:

One is the objective of trying to raise workers' wages, again trying to improve the benefits that the average household or the average worker gets from China's red-hot growth. Now this, of course, is a little inconsistent in the short run with trying to deal with the inflation problem because, of course, if you tried to raise wages, that is going to have immediate inflationary consequences.

The second issue is trying to maintain the exchange rate as it is, while at the same time opening up the capital account more. And of course, the more you open up the capital account, the harder it is going to be to manage exchange rate pressures.

So the final issue is whether despite all the recognition about what needs to be done in China, whether there is going to be the political will to push forward with these reforms, and there are two significant barriers there.

One is that the present system works very well for a lot of people in China. For the politically well-connected state-owned enterprise bosses, for many of the bank chairmen, this is actually a very good system because it keeps profits flowing into the state enterprises, into the banks, and some of it eventually flows into other parts of the economy, the political as well as economic elite.

And the second issue is whether, in fact, China is going to be able to take these large steps because ultimately if you try to undertake significant transformation of the economy, which inevitably leads to dislocation, without a large and comprehensive social safety net in place, it's going to create a lot more turmoil.

So how China manages these multiple challenges is going to be the key issue. They've done a fantastic job so far, but I think some very big challenges lie ahead. Thank you.

[The written statement follows:]

PREPARED STATEMENT OF DR. ESWAR PRASAD
TOLANI SENIOR PROFESSOR OF TRADE POLICY
CORNELL UNIVERSITY, ITHACA, NEW YORK AND
SENIOR FELLOW AND NEW CENTURY CHAIR IN INTERNATIONAL ECONOMICS
BROOKINGS INSTITUTION, WASHINGTON, DC

U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION

HEARING ON "CHINA'S TWELFTH FIVE-YEAR PLAN, INDIGENOUS INNOVATION AND TECHNOLOGY TRANSFERS, AND OUTSOURCING"

June 15, 2011

China's Approach to Economic Development and Industrial Policy

Eswar S. Prasad[1]

Tolani Senior Professor of Trade Policy, Cornell University
Senior Fellow and New Century Chair in International Economics, Brookings Institution

Chairmen Slane and Mulloy, and honorable members of the Commission, thank you for the opportunity to share with you my views on China's twelfth five-year plan and the implications for China's growth and reform strategy.

The plan lays out the momentous challenges that China faces in short-term macroeconomic management and longer-term structural transformation of the economy. This plan could herald a turning point in China's economic development as it represents a marked shift in emphasis from high growth to the quality, balance and sustainability of that growth.

Premier Wen Jiabao's report to the National People's Congress, which should be read in conjunction with the other plan documents, strikes an interesting balance between self-congratulation for China's economic performance over the last five years, including the economy's resilience during the global financial crisis, and a sober evaluation of the immense development challenges that lie ahead.

The plan document is comprehensive and lists a large number of reform priorities. The emphasis on controlling prices through various policies clearly indicates that the major short-term priority for the government is to manage inflationary pressures.

The plan contains a set of medium-term objectives but has limited detail on specific courses of action for achieving those objectives. There is much more specificity about the actions being undertaken or under contemplation for attaining short-term objectives such as controlling inflation.

The longer-term objective of the plan is to reorient growth to make it more balanced and sustainable from different perspectives--economic, social and environmental. It will be a major challenge to put in place the reforms needed to rebalance the growth model and shift away from capital-intensive production, reduce the reliance on exports, generate more employment and allow more of the benefits of growth to filter down to the average household.

[1] I am grateful to Lei (Sandy) Ye and Karim Foda for excellent research assistance.

The plan documents send a direct and unambiguous message to provincial governments that they should shift from a focus purely on growth to broader economic and social considerations. But it is not clear that incentives facing provincial governments can be shifted easily.

The plan reveals some tensions between addressing short-term concerns and pushing forward with longer-term structural reforms. For instance, raising wages for workers is at odds with the goal of containing inflation. The plan indicates that further steps will be taken to liberalize controls on capital flows even as it recognizes that hot money inflows have added to domestic liquidity and helped fuel inflationary pressures.

The plan highlights the objectives of further financial system reform and progress towards capital account convertibility. However, few details are offered about such objectives. The plan has more details concerning policies that have direct implications for the average Chinese household--controlling inflation, increasing wages and employment, and strengthening the social safety net.

The reform agenda is clear but what is less certain is whether the government has the political will to take on such an ambitious reform agenda, battling against the vested interests that want to maintain the status quo and coping with social pressures from the short-term dislocations that the reforms might create. But China's leaders may have little choice if they want to maintain their legitimacy and social stability.

Short-term Challenges

The major short-term policy challenge is to bring inflation under control. Chinese policymakers are understandably nervous about CPI inflation at a level above 5 percent. As in many other emerging markets, overall price dynamics are being driven by food prices. Food expenditures on average constitute about one-third of total consumption expenditures for Chinese households, so this is a major component of the CPI basket and food price inflation feeds into higher overall inflation by influencing wage demands. So far, nonfood inflation remains modest at about 3 percent (Figure 1).

But modest nonfood inflation is scant comfort for China’s government. Food price increases hit the poor a lot harder as food expenditures account for a larger share of their total expenditures compared to middle class households. The urban poor face a double whammy as they do not benefit from food price increases and measures to tighten policies to control inflation could affect their employment prospects.

The government has responded aggressively to contain inflation by clamping down on growth in monetary aggregates and bank credit (Figure 2). The policy complication is that tightening credit could hurt employment growth by reducing credit flows to small and medium sized enterprises, especially those in the private sector. Moreover, standard monetary policy tools are typically not very effective at dealing with food price increases. Consequently, the government has taken a number of administrative measures, including price controls on some products.

The key question is whether macroeconomic policies can be calibrated in a manner that

brings inflation under control without knock-on effects on growth. This is not an easy task as the government is simultaneously aiming for a major transformation of the economy's structure.

The risk of a hard landing has increased but still remains modest. Even if this risk did come to pass, the effects may not show up directly as a collapse in output growth but could take the form of a sharp fall in employment growth and a setback to other aspects of the growth rebalancing agenda.

Structural Transformation

Shifting the growth model

A major priority laid out in the plan is to rebalance growth to reduce the reliance on investment and exports and instead increase the share of private consumption to GDP. This is seen as necessary to ensure greater social stability by increasing the benefits that accrue to the average household from China's red-hot GDP growth. In addition, shifting away from a capital-intensive production structure is important for ameliorating the destructive environmental consequences of rapid growth.

Factors such as rising wages could help boost consumption demand. Other fundamental reforms, including a stronger social safety net and a better government-funded health care system, are also necessary to shift consumption patterns of Chinese households.[2] The plan recognizes these issues and contains a number of proposed measures that would increase the coverage and extent of government financing of health care, pensions and the broader social safety net.

Growth also needs to become more balanced in terms of reducing regional disparities in economic development, especially when one compares the coastal versus the interior provinces. In addition, rising income inequality coupled with rising inflation that hits the poor especially hard can have serious implications for social stability, especially in urban areas where the urban poor are being hammered by high food price inflation.

Hasn't the Chinese economy's dramatic growth performance during the crisis shown that it has become less dependent on advanced economy export markets especially as GDP growth remained strong despite a decline in the trade surplus during 2009?

Answering this question requires a retrospective look at the Chinese growth model. There are two distinct features of the Chinese growth process in the decade before the crisis, when GDP growth averaged about 10 percent per annum.[3] First, investment

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[2] For an analysis of the factors driving the trend increase in saving rates of urban households, see Marcos Chamon and Eswar Prasad, 2010, "Why Are Saving Rates of Urban Households in China Rising?" *American Economic Journal: Macroeconomics*, Vol. 2, No. 1, pp 93–130; and Marcos Chamon, Kai Liu and Eswar Prasad, 2010, "Income Uncertainty and Household Savings in China," NBER Working Paper No. 16565.

[3] For more details, see Eswar Prasad, 2009, "Is China's Growth Miracle Built to Last?" *China Economic Review*, Vol. 20, pp. 103–123. Also see Eswar Prasad and Grace Gu, 2009, "An Awkward Dance: China and the United States," Brookings Institution Policy Note.

accounted for more than half of overall GDP growth during the 2000s, with net exports playing an important role as well from 2005 to 2007 (see Figure 3). Private consumption, by contrast, has not been a key driver of growth. Second, even high GDP growth has not translated into much employment growth, with overall net employment growth averaging only about 1 percent over the last decade.[4]

The growth model fostered by government policies has resulted in a rising share of investment and a declining share of private consumption in GDP (Figure 4). Moreover, weak employment growth and high investment growth have resulted in labor income falling as a share of national income and personal disposable income falling as a share of GDP (Figures 5-6). Thus, the Chinese government has had to cope with the twin challenges of boosting domestic consumption in order to make growth more welfare enhancing for its citizens and of generating higher employment growth in order to maintain social stability.

To counter the aftershocks of the crisis, the Chinese government embarked on a massive fiscal and monetary stimulus program in the latter half of 2008. In addition to an increase in government spending, state-owned banks were directed to make credit freely available. The banks went on an unprecedented lending spree, amounting to nearly $1.5 trillion (or about one-third of China's GDP) in 2009. With cheap and plentiful money, along with subsidized inputs such as energy and land, conditions were ripe for a massive investment boom, which amounted to nearly 90 percent of GDP growth in 2009.[5]

This investment boom is to some extent feeding on itself—so long as financing is available for construction and infrastructure projects, investment in ancillary industries pays off. But a slowdown in the investment machine as the government tightens credit supply could result in excess capacity in industries such as steel, aluminum and hard glass. Down the road, this could dampen employment and household income growth. Banks fear a resurgence of bad loans on their books if consumption demand doesn't grow fast enough to soak up output from the new factories. Moreover, the Chinese household saving rate has trended upward in recent years; the economic uncertainty associated with the crisis and the weak global economic recovery are likely to increase savings for precautionary purposes (Figure 7).

In short, the stimulus kept the Chinese economy humming along but in some ways actually worsened the balance of growth by tilting it even more towards growth led by investment rather than private consumption. The concern is that any dampening of domestic consumption growth could eventually increase the dependence on export-led growth, exactly the reverse of the balanced private consumption-led economy that Chinese leaders want. The reliance on exports, as noted earlier, is also because it is a key source of net job growth.

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[4] The annual growth rate of non-agricultural employment averaged around 2.5 percent during this period, although this in turn has to be set against the growth rate of non-agricultural output, which has been 2-3 percentage points higher than that of overall GDP.

[5] Increases in private and government consumption demand amounted to about 45 percent of GDP growth, but this was offset by a large negative contribution of net exports to growth as the trade balance fell sharply in 2009 relative to 2008.

External balance, dependence on exports

One dimension of growth rebalancing on which there has in fact been progress is related to China's external balances. The trade surplus fell from its peak level of over 7 percent of GDP in 2007 to 3 percent in 2010 (Figure 8). Export and import growth took a tumble during the financial crisis but have since recovered sharply (Figure 9). The investment boom has driven import growth sharply higher while export growth has been strong but lower than import growth due to weaknesses in advanced country markets that absorb a large fraction of China's imports.

In recent months, the trade surplus has again begun to widen and it is likely that the current account surplus will also rise. There is a sharp divergence of views among analysts about the direction in which these surpluses are headed. One view is that China has made durable progress in rebalancing its economy and reducing its dependence on exports. An alternative view is that China's shrinking trade surplus is largely a cyclical phenomenon. China has grown strongly, sucking in huge quantities of imports, while its major export markets in the euro zone and the U.S. are just getting back on their feet after the global financial crisis.

This spills over into a wider debate about whether China has actually made significant progress on rebalancing its economy and contributing less to global imbalances. This is summarized by the stark difference between two key institutions in their forecasts for China's current account to GDP ratio—the IMF pegs it at over 6 percent in 2012 while the World Bank puts it a shade under 4 percent (Table 1). My view is that both China's trade and current account surpluses will rebound as cyclical factors unwind, especially if China manages to clamp down on credit growth and cools its economy while the U.S. and Europe solidify their recoveries (all of which remain slightly dubious propositions at this stage).

The currency regime and capital account convertibility

China continues to intervene massively in foreign exchange markets to counter pressures for renminbi appreciation. China accumulated $448 billion of foreign exchange reserves in 2010, matching the pace in 2009 (Figure 10). The merchandise (goods) trade surplus of $185 billion accounts for less than half of this reserve accumulation in 2010 (the overall trade surplus on goods and services was lower at about $165 billion). It is also unlikely that valuation effects can account for the rapid pace of accumulation in 2010.[6]

China's torrid pace of reserve accumulation continued in the first quarter of 2011, when it accumulated another $196 billion of foreign exchange reserves (Figure 10).[7] Reserve

[6] Indeed, the dollar appreciated slightly relative to the euro during the year. The dollar-euro rate was 1.43 on Dec. 31, 2009 and 1.34 on Dec. 31, 2010. Assuming that most of China's foreign exchange reserves are held in instruments denominated in dollars or euros, this means that the valuation effects in fact held down the pace of reserve accumulation in dollar terms.

[7] Valuation effects could account for about $50-60 billion of this increase (on the other hand, China recorded a marginal deficit on its trade account in this quarter). The euro appreciated relative to the dollar by about 6 percent during the first quarter. Assuming that about one-third of China's reserves

accumulation at the rate of nearly $200 billion in each of the three previous quarters highlights the Chinese central bank's continued heavy intervention in the foreign exchange market. Even assuming significant returns on its existing stock of reserves (that could be showing up as new reserve accumulation), the implication of such rapid accumulation is that capital continues to seep into China through a variety of channels despite all the controls on inflows. Managing capital flows and their impact on domestic liquidity and inflation will be a major challenge for the Chinese government during 2011, especially if it continues to strongly resist currency appreciation.

In fact, the renminbi's appreciation relative to the dollar has been quite significant, especially in inflation-adjusted terms. Following its re-depegging from the dollar in June 2010, the renminbi has appreciated by about 5 percent in nominal terms against the dollar. On an inflation-adjusted basis, this implies that the renminbi is appreciating at a rate of about 7-8 percent a year in real terms relative to the dollar.[8]

While China's currency has been appreciating against the dollar, the dollar has been in broad retreat against other major currencies. Consequently, despite its nominal appreciation against the dollar and the high inflation rate in China, the renminbi's real effective exchange rate has remained relatively flat over the past year (Figure 11). Signs such as rapid reserve accumulation suggest the currency is still significantly undervalued on a multilateral basis.

China's currency policy threatens to upset the delicate balance between keeping growth strong and inflation at moderate levels. China's strong growth prospects and resurgent trade surplus will pull in large amounts of capital inflows from abroad, adding to the liquidity in the financial system and increasing the risks of higher inflation and asset market bubbles.

A currency appreciation would serve the dual objectives of tamping down inflationary pressures and helping to shift the balance of growth towards private consumption. Indeed, a more flexible currency would eventually allow the central bank a much freer hand in changing interest rates to meet the twin objectives of high growth and low inflation. A currency appreciation would help rebalance growth by increasing the purchasing power of domestic households. This would happen directly through the fall in the price of imported goods and also by giving the central bank room to raise deposit rates, giving households a better rate of return on their savings.

All of this makes it surprising that China has not used currency appreciation more aggressively as a tool in the fight against inflation and as one way of promoting more balanced growth. It seems that a huge political bar has to be crossed before the Chinese leadership accepts the use of currency policy as a tool against inflation. The twelfth five-year plan has little to say on this subject other than the ritual affirmation of steps to improve the exchange rate formation mechanism.

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are held in euro-denominated investments, the valuation effects in dollar terms could account for about $55 billion (2.84 trillion * 1/3 * 0.06). The Japanese yen, by contrast, depreciated slightly relative to the dollar during the quarter.

[8] The renminbi's value was held fixed relative to the dollar from July 2008 to June 2010. As of April 2011, twelve-month CPI inflation was 3.2 percent in the U.S. and 5.3 percent in China.

China is eager to make the renminbi an international currency and has already taken a number of small steps in that direction. However, contrary to expectations in some quarters, the plan did not lay out a timeline for opening up the capital account and making the currency fully convertible. There are other indications that this is seen as a policy objective over the next 5-10 years as it would set the stage for China's ascendancy in global financial markets and make the renminbi an international currency. Indeed, the Chinese government has recently taken a number of relatively modest but symbolically significant steps to increase the use of the renminbi in international transactions, including trade settlement. The government is appropriately reticent about dismantling capital controls and allowing freer cross-border movement of capital without having a robust and well-functioning financial system in place.

Financial sector development and reform

Financial sector reform remains a key priority that is highlighted in the twelfth five-year plan. The Chinese government recognizes that a more efficient financial system can play an important role in increasing productivity by reducing inefficiencies in the allocation of capital. A reformed banking system may also respond to incentives to lend more to small- and medium-sized enterprises, especially in the services sector, that tend to be better than large enterprises at generating employment.

China's banking system appears well capitalized and the ratio of nonperforming loans relative to assets for the overall banking system is quite low. These figures mask a number of well-known problems, including persistent incentives to lend to state-owned enterprises rather than private sector enterprises, weak risk management capacity that results in credit to small and medium sized enterprises being rationed, and asset portfolios that include a significant amount of subpar assets that may turn into nonperforming loans if economic growth slows down.

Interest rate liberalization is an important element of banking reforms. At present, there is a ceiling on deposit rates and a floor on lending rates, resulting in a comfortable and noncompetitive spread that helps the profitability of banks. One effect, as noted earlier, is that households earn low or negative inflation-adjusted rates of return on their copious deposits in the banking system. Another is that the absence of price competition makes the banking system less efficient. Belying expectations--as many Chinese officials have mentioned this as a reform priority--the plan did not contain any specific language about interest rate liberalization, suggesting that the prospects for any significant steps in this area are remote for the time being.

China's financial system remains bank-dominated, with limited corporate bond market development and limited scope of securities markets. The plan recognizes the need to broaden and deepen financial markets in order to improve their overall functioning and enhance their contribution to balanced growth. But this remains an aspiration rather than an objective backed up by a well-defined strategy.

Industrial policy

The plan lays out two sets of objectives in this area. The first is to upgrade and restructure a group of traditional industries. The second is to foster and develop seven strategic emerging industries.

The traditional industries highlighted in the plan include (i) equipment manufacturing, (ii) shipbuilding, (iii) automobiles, (iv) iron and steel, (v) nonferrous metals, (vi) building materials, (vii) petrochemicals, (viii) light industry, and (ix) textiles. These industries are identified as needing technical upgrading as well as consolidation to benefit from scale efficiencies.

The industries that the government wants to develop into future pillars of the economy have a hi-tech or environmental focus. They include (i) energy conservation and environmental protection, (ii) new-generation IT, (iii) bio-tech, (iv) high-end manufacturing equipment, (v) new energy (including nuclear and renewable energy), (vi) new materials, and (vii) new-energy automobiles. The government intends to set up special funds to develop these new strategic industries. These funds will encourage start-ups and also complement private investment in these industries.

There are two important issues that will need to be tracked carefully as these objectives are transformed into concrete policy measures. The first is whether these measures will shift industry dynamics in a way that favors state-owned firms, thereby rolling back some of the gradual shift in the last two decades towards a more private sector-led industrial structure. The second issue, which has an international dimension, is whether some measures could take the form of explicit or implicit subsidies that are in violation of WTO guidelines.

In any event, China is clearly taking some important steps towards upgrading its industries and moving towards more hi-tech and high value added production. With various incentives and explicit government support, China is likely to make quick progress in clean energy and information technologies. The U.S. and other advanced economies could start losing ground in new technologies if China successfully implements its strategy of technology leap-frogging.

Conclusion

China's twelfth five-year plan could represent a watershed in the country's pattern of economic development. The broad objective of the plan is to reorient growth to make it more balanced and sustainable from different perspectives--economic, social and environmental. The challenge for the government is to break down the opposition of interest groups that prefer the status quo and to implement reforms needed to attain the plan's objectives. With a leadership transition looming in 2012-13, it is possible that the window for reforms will shut for the time being and the medium-term elements of the plan will not be acted upon forcefully until the new leaders have found their footing and consolidated their power bases.

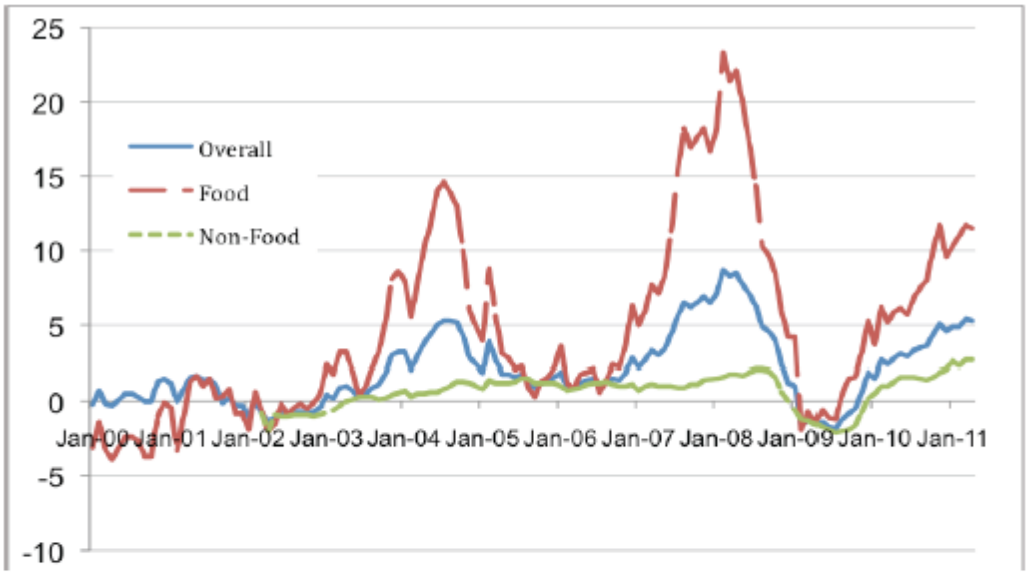
Table 1. Official Forecasts of China's Current Account Balance
(in percent of GDP)

	Current Account Balance	
	World Bank	IMF
2010[a]	5.2	5.2
2011	3.6	5.7
2012	3.8	6.3
2013		6.8
2014		7.2
2015		7.6

Sources: World Bank, China Quarterly Update, April 2011; IMF WEO, April 2011

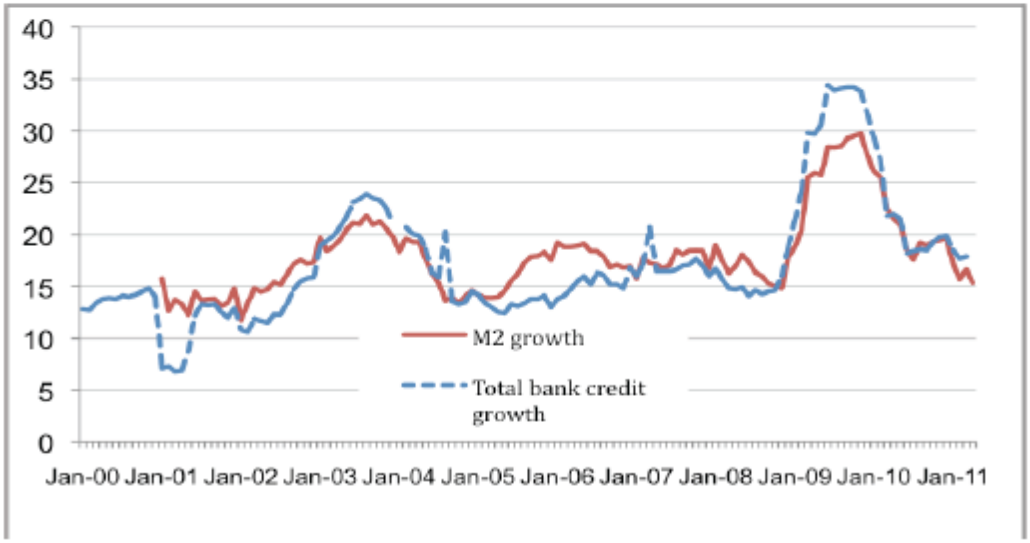
[a] Actual

Figure 1. Inflation
(12-month inflation rates based on CPI indexes)



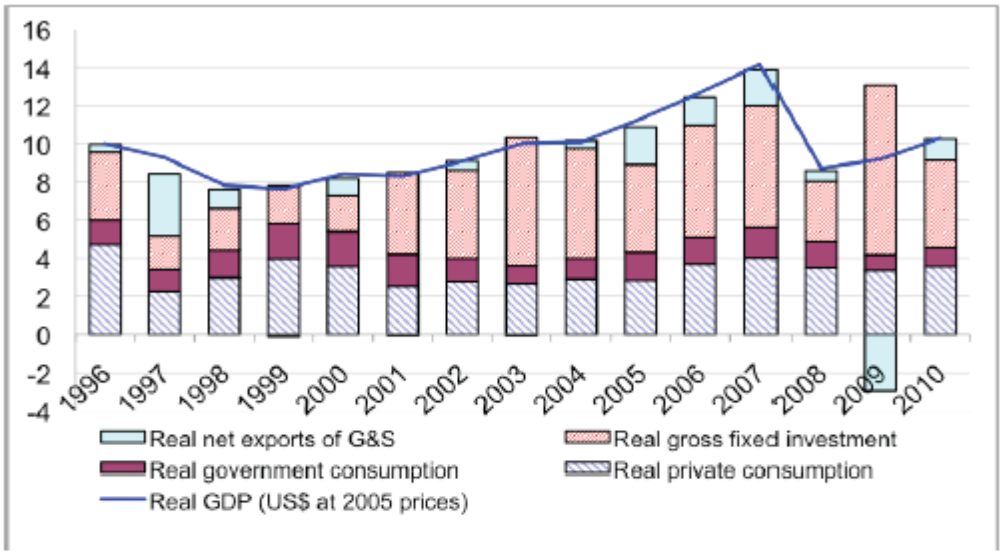
Sources: National Bureau Statistics; Haver; CEIC

Figure 2. Money and Credit Growth
(12-month growth rates)



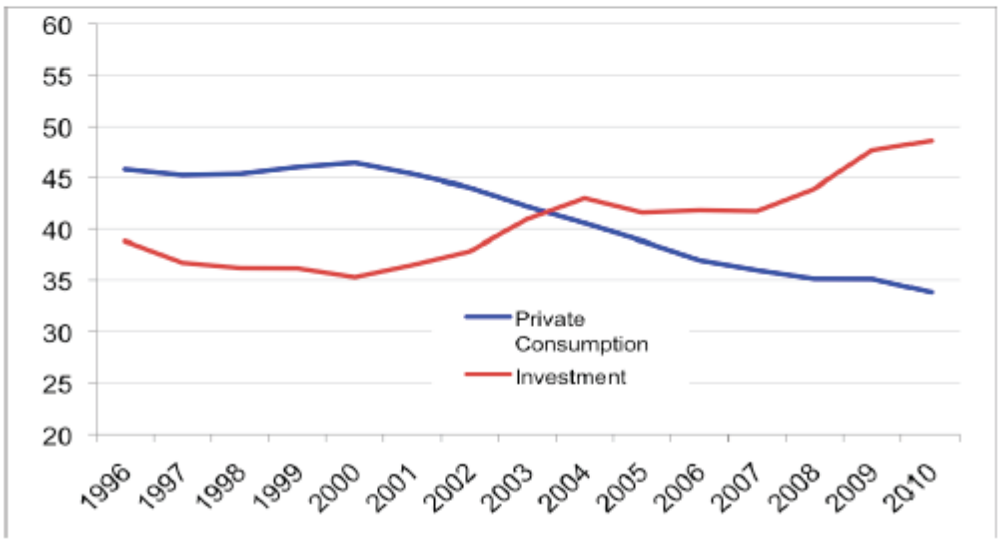
Sources: National Bureau Statistics; Haver; CEIC
Note: Bank credit growth through March 2011.

Figure 3. Composition of GDP growth
(in percent)



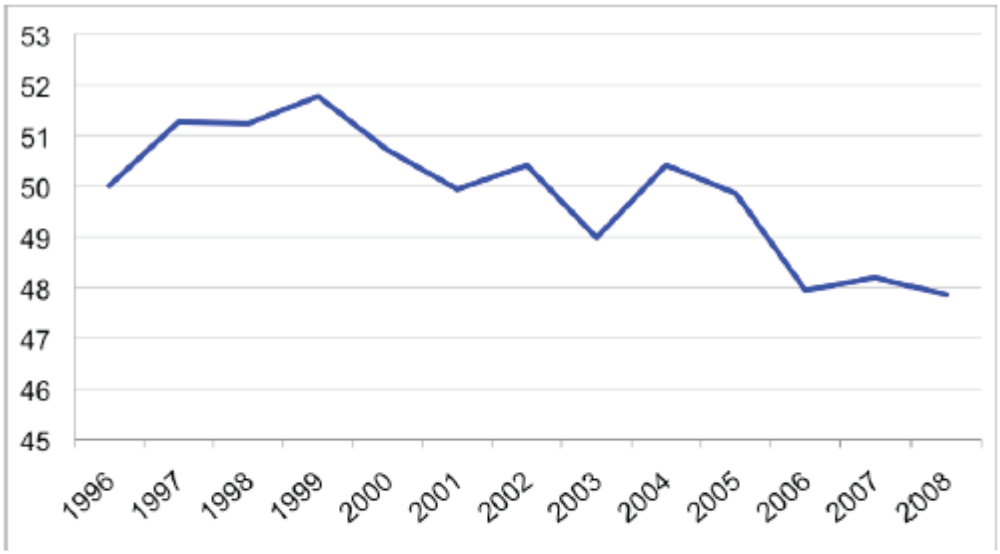
Source: EIU CountryData.
Note: Shaded regions in each bar show the contributions (in percentage points) of each component to total GDP growth. 2010 data are EIU estimates.

Figure 4. Shares of Private Consumption and Investment in GDP
(in percent)



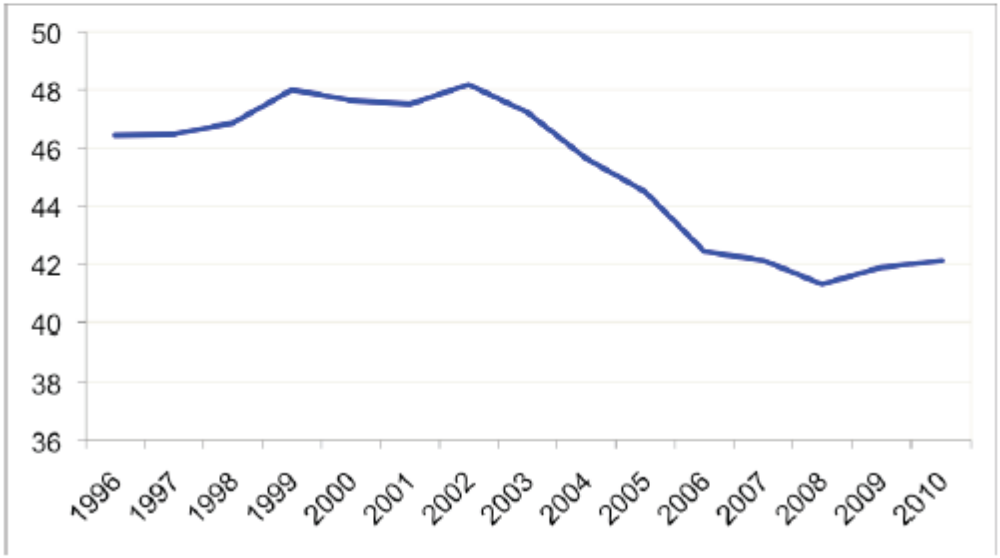
Source: EIU CountryData. 2010 data are EIU estimates.

Figure 5. Labor Income as Share of National Income
(in percent)



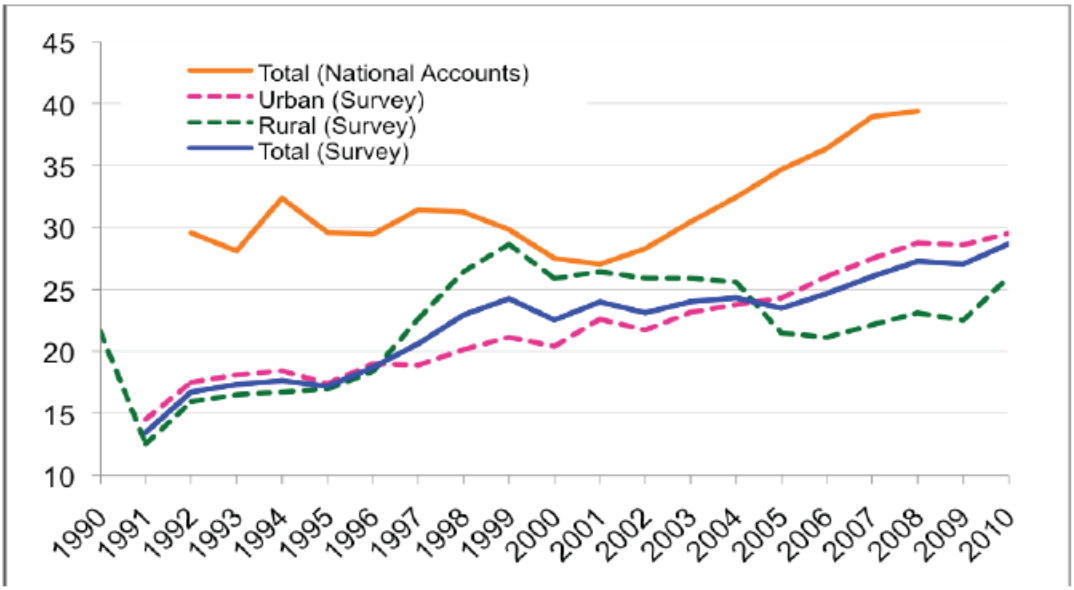
Sources: Flow of Funds data, CEIC.

Figure 6. Personal Disposable Income as Share of GDP
(in percent)



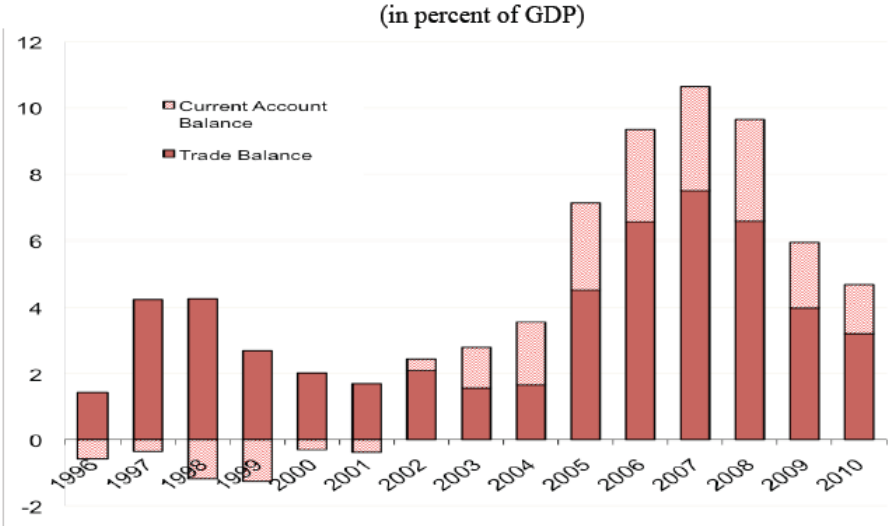
Source: EIU CountryData. 2009 and 2010 data are EIU estimates.

Figure 7. Household Saving Rate
(as percent of household disposable income)



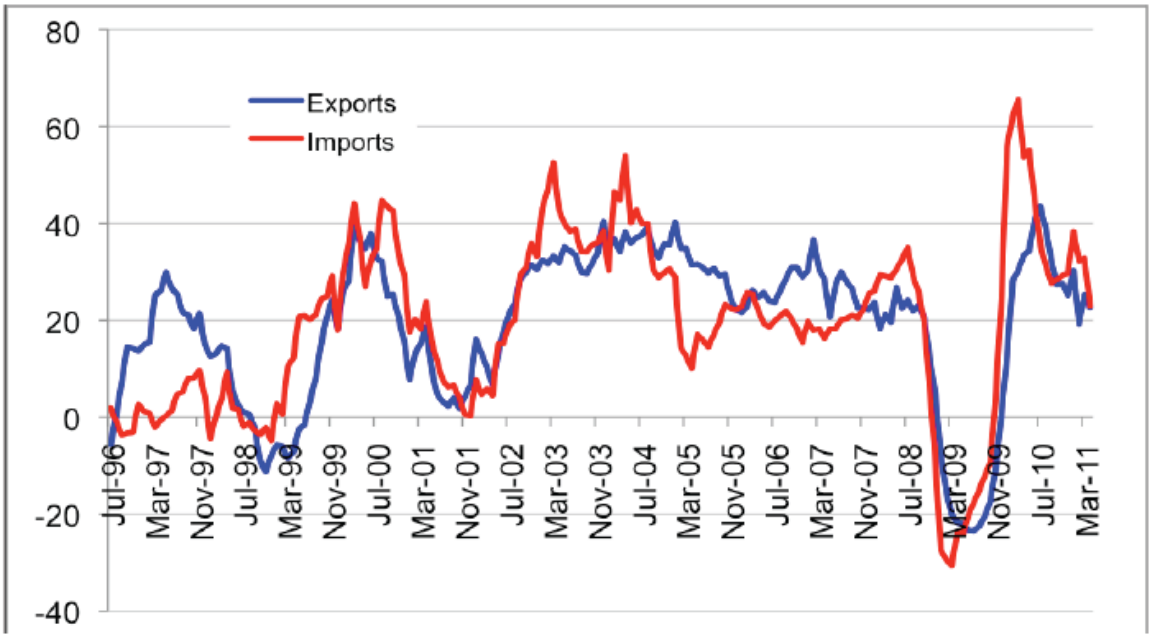
Source: CEIC and author's calculations.
Notes: Household savings survey data are based on per capita income and consumption, and population available through CEIC. Saving rates from the Urban and Rural Household Surveys are expressed as a share of disposable income and net income respectively. Saving rates from National Accounts (Flow of Funds) are expressed as a share of disposable income.

Figure 8. External Balances
(in percent of GDP)



Source: CEIC.

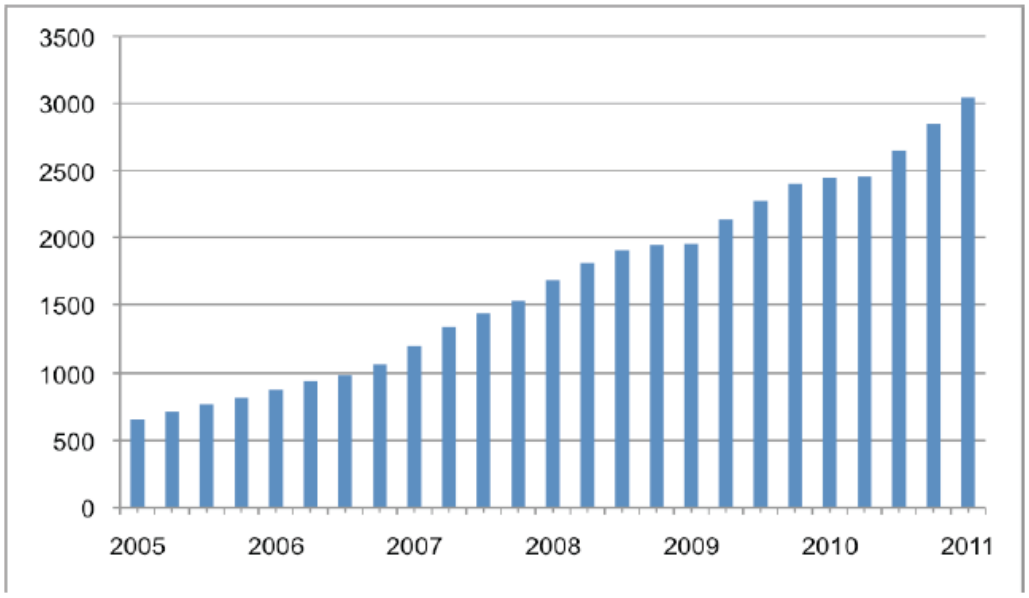
Figure 9. Export and Import Growth
(12-month growth rates)



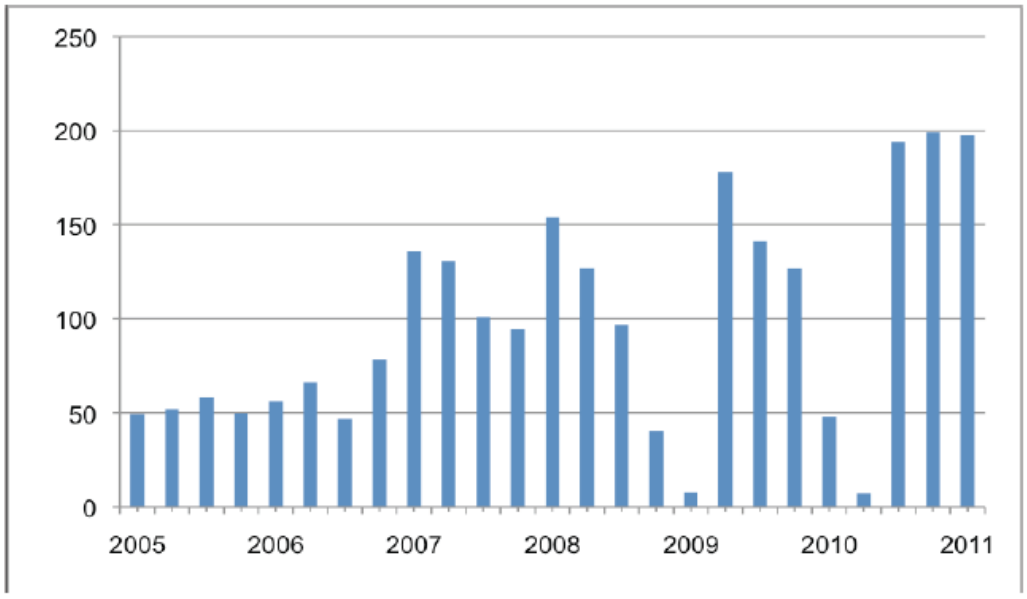
Source: CEIC.

Figure 10. Foreign Exchange Reserves
(USD billions)

Foreign Exchange Reserve Stocks: 2005Q1 – 2011Q1



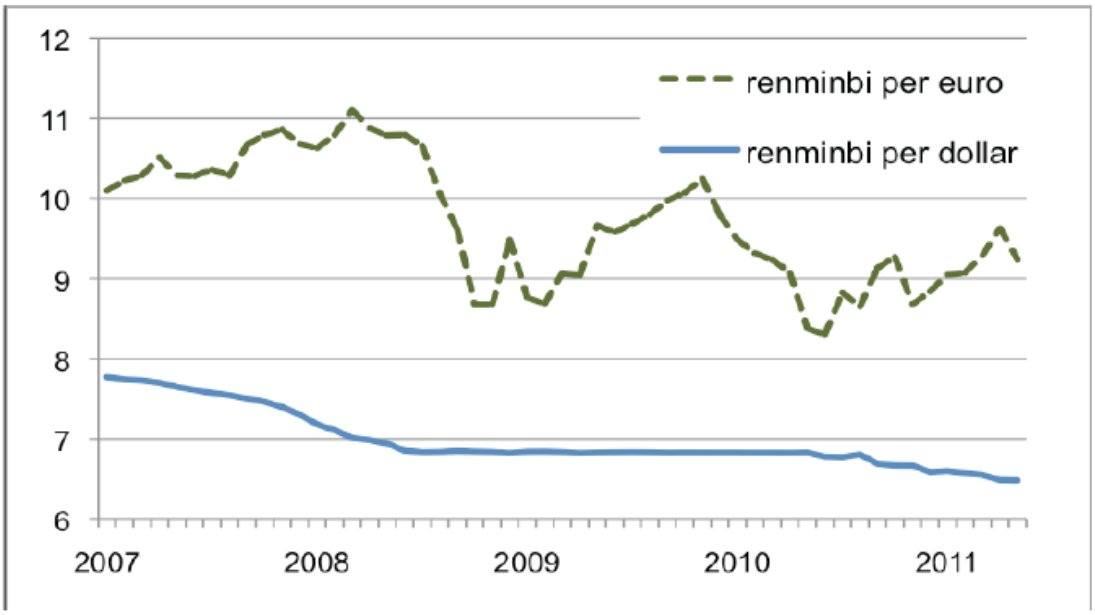
Accumulation of Foreign Exchange Reserves: 2005Q1 – 2011Q1



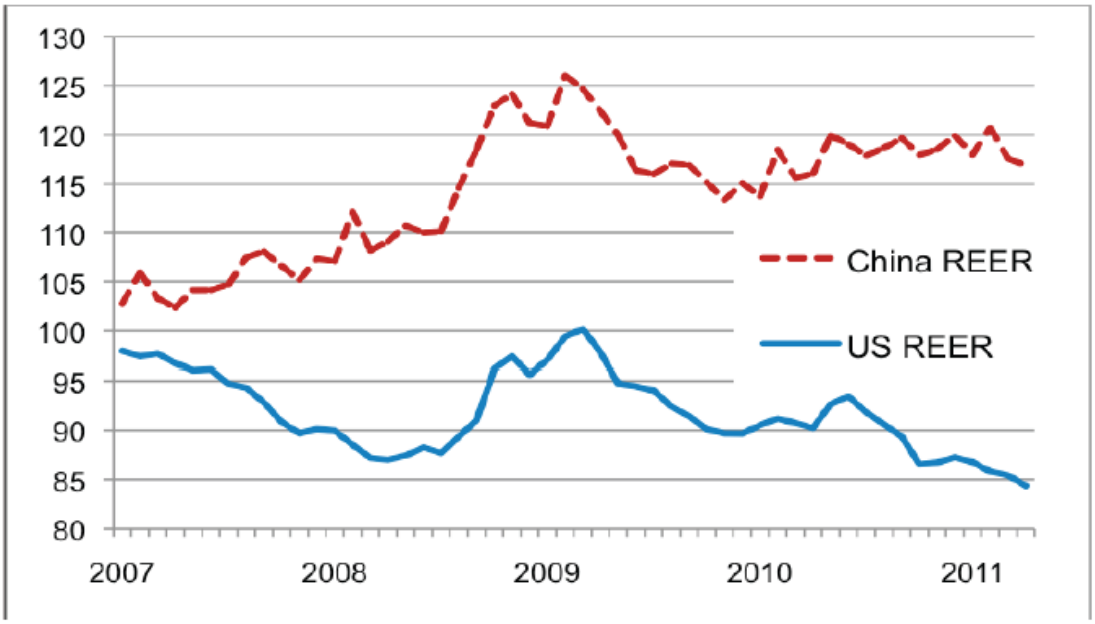
Sources: People's Bank of China; Haver
Note: End of quarter figures.

Figure 11. Exchange Rates

Nominal Exchange Rates: Jan. 2007 - May 2011



Real Effective Exchange Rates: Jan. 2007 - Apr. 2011



Source: Bank of International Settlements
Note: Real effective exchange rates are based on broad currency baskets. Index 2005 = 100.

HEARING CO-CHAIR MULLOY: Thank you, Dr. Prasad.

Dr. Shih.

STATEMENT OF DR. WILLY C. SHIH
PROFESSOR OF MANAGEMENT PRACTICE, HARVARD BUSINESS SCHOOL
BOSTON, MASSCHUSETTS

DR. SHIH: Commissioner Mulloy, Commissioner Slane, and other panel members, Commission staff, and distinguished guests, good morning, and thank you for the invitation to speak with you this morning.

China's 12th Five-Year Plan focuses on development of what it calls seven strategic emerging industries. Within those industries, 35 projects have been identified. I have listed these industries and sub-industries in Exhibit 1 submitted in the written part of this testimony.

To just highlight a few of them: high efficiency energy-saving technologies like lighting; next generation mobile communications; Internet core equipment; the Internet of things; cloud computing; high-end software and servers; bio-pharmaceuticals; smart assembly; nuclear, solar, wind and biomass power, and smart grids; advanced materials and composites; and electric and fuel-cell cars.

I believe this plan is strongly aligned with the other guiding policies from the central government, in particular, the "Medium to Long Term Plan for the Development of Science and Technology," issued in 2006, which articulated the goal of making China an innovation-oriented society.

I think these are in response to the perception that opening the country to foreign direct investment has not led to the improvement of domestic innovation capabilities, and that foreign technologies continue to dominate the high-value parts of high-tech products with China relegated to low value-added labor-intensive roles in global production networks.

A great deal of China's advanced production capabilities rely on imported tools that embody technology and know-how or the licensing of foreign technologies that often are a generation or more behind.

Thus, by calling out specific projects, the government can target areas for investment and capability development. This is implemented through the research agendas of universities and research institutes, the strategies of state-owned enterprises, and through projects, policies, and incentives that favor the areas mentioned.

The driver for the rollout of plans is the annual goal setting cycles at all levels in the government. Meeting targets for a city, region or province, for example, is the path to advancement for officials in the Party. Those who do a superlative job get chosen for prime leadership positions. Those who fail to meet those targets get sidetracked. So the motivation is really

quite powerful.

These areas represent the leading areas of innovation in advanced economies like the U.S. and Europe as well. The 12th Five-Year Plan is a continuation of a long-term strategy of capability building that has been in place for decades.

Now what are the implications for the United States? First, I think we will see increasing market competition for American firms across the board from Chinese companies with the circumstances in some industries more pressing than others. U.S. firms will not necessarily be global leaders in many fields where we take such leadership as a given.

Chinese companies like Huawei will increasingly be world leaders in supplying advanced technology products to world markets. The seeds are already sown. This means America and all nations will increasingly turn to Chinese companies for the purchase of products with higher intellectual content and not just products with high labor content.

Huawei supplying the core telecom infrastructure in Iraq is one example, but we'll likely see other technologies like wind energy, solar and others. This will make our trade deficit problem even more challenging that it already is.

Second, I think we will see increased purchases of Western companies as a path to acquire technology. I visited a German manufacturer last month that expressed concerns over the acquisition by Chinese companies of German companies that controlled key advanced machine tool technologies. I should point out that these purchases are not limited to SOEs. Geely's acquisition of Volvo is an example of what I consider a distress sale in the West which gave key system-level capability to a rising private automaker in China.

And as the Chinese currency gets stronger, these purchases become easier. That's one of the downsides of our trade deficit. The inevitable impact on the dollar has put America on sale.

Third, the U.S. must prepare for the eventuality that we will have to source critical military technology abroad as more of our domestic capabilities wither away.

What we haven't focused on as a nation yet with the exception of DoD and DARPA is the importance of so-called dual-use technologies. This is well understood in China. It's not widely understood here.

With regard to point four, will China's indigenous innovation policies help them, I think the 1994 Automotive Industrial Policy, which is part of the 9th Five-Year Plan, is a good role model. That plan sought to force increasingly complete transfers of automotive technology and know-how to China.

The plan has had considerable success with China now equipped with modern production plants and the management capability for running them.

Today, the Chinese auto market is the largest in the world. It's also the most profitable in the world, and it is driven by domestic consumption, not export. And it has also laid the institutional foundation for another large export industry of vehicles and vehicle components.

I visited a U.S. wind turbine manufacturer last month. Though they are a technological leader in direct drive permanent magnet designs, they will face increasing competitive pressure, especially as they increasingly have to source critical components in China.

Even though transport costs favor local manufacture, I'm unfortunately pessimistic about the long-term prospects for U.S. firms in this sector.

Some segments will take more time. I believe it will take years before Chinese companies will be able to design and manufacture, for example, the hot section of a commercial air transport engine. But they will invest a huge amount trying. I think the Chinese will make faster progress on the military side.

I believe that China's indigenous innovation policies will help them advance up the value chain to more sophisticated and valuable segments. Progress will not be uniform, but for the last 25 years or more, China's Five-Year Plans have targeted the development of capabilities and their goal-setting incentive systems and long-range thinking have served them extraordinarily well.

What are the implications for the United States should China capture leadership of these seven SEIs? Well, I think China will capture more of the higher value-added segments in many industries. Again, Huawei is a good example. It has a significant number of essential patents covering LTE in 4G phone systems. We'll likely see that pattern repeated in other industries although it won't be uniform.

The value capture could accrue to Chinese companies as well as global multinationals operating within China, and I think we'll inevitably see increases in the share of global R&D in those fields pulled into China as well.

Having said that, let's not be too harsh on China. This is no different than what happened in Japan over the last 40 years, and I just remind us that 70 percent of the world's semiconductor foundry capacity is in three science parks in Taiwan. So, you know, there are repeating patterns here.

Will China transition from its current export and investment led growth to a model that has called for increased domestic consumption? I think, again, we can look at the 1994 AIP as a role model.

The economic crisis that started in the United States gave significant pause to Chinese leadership, forcing them to recognize that an overdependence on export to countries like the U.S. put their stability at grave risk.

I traveled extensively across Asia at the depths of that crisis. I saw

vast capacity underutilization and huge employment challenges. That's the motivation, in my opinion. They don't want to go through that again.

So back to the question: will we see a shift from export-led to domestic consumption-led growth? I believe we will, and the proportion will vary across industrial sectors, but China will continue to be an export powerhouse because so many global supply chains have relocated there. Those supply chains took decades to move, so for many industries, there's no short-term alternative. That die is cast.

Because of time limitations, I wanted to focus my time on answering the questions posed by the Commission, and I will leave my recommendations to my written testimony.

But I wanted to close on a personal note about five-year plans. When I was a child, I used to laugh at China's five-year plans. The "Great Leap Forward" and others were a big joke to me because of the frequency of perverse outcomes amidst poor central planning choices. But over the last two decades, I've come to change my view. Starting with the "863" plan, and that was called "863" because it was March 1986 that it was initiated, I started to pay more attention, a lot more attention, because the Chinese have been diligent in learning from their mistakes and improving their goal setting and measurement systems.

Are they perfect? Not by any means. They will often have perverse outcomes, but they work on it every day, and they try to learn from their mistakes. In this regard, I don't fault them for what they are doing. They are focusing intently on the capabilities required to be competitive in a modern global economy. It would serve us well to do the same in this country.

Thank you very much.

[The written statement follows:]

PREPARED STATEMENT OF DR. WILLY C. SHIH
PROFESSOR OF MANAGEMENT PRACTICE, HARVARD BUSINESS SCHOOL
BOSTON, MASSCHUSETTS

Commissioner Mulloy, Commissioner Slane, other panel members, commission staff, and distinguished guests, good morning, and thank you for the invitation to speak with you this morning.

China's 12th Five Year Plan focuses on the development of what it calls seven strategic emerging industries (SEIs). Within those seven industries, 35 projects have been identified. I have listed these industries and sub-industries in Exhibit 1 submitted in the written part of this testimony. To highlight a few of them: high-efficiency energy saving technologies like lighting, next-generation mobile communications, Internet core equipment, Internet of things, cloud computing, high end software and servers, bio-pharmaceuticals, high-end assembly and manufacturing including aerospace, rail and transport, and smart assembly, nuclear, solar, wind and biomass power and smart grids, advanced materials and composites, and electric and fuel cell cars.

I believe that this plan is strongly aligned with the other guiding policies from the central government, in particular

the "Medium to Long Term Plan for the Development of Science and Technology" issued in 2006, which articulated the goal of making China an innovation-oriented society. I think these are in response to a perception that opening the country to foreign direct investment has not led to improvement of domestic innovation capabilities and that foreign technologies continue to dominate the high value parts of high-tech products, with China relegated to low value-added labor intensive roles in global production networks. A great deal of China's advanced production capabilities rely on imported tools that embody technology and know-how, or the licensing of foreign technologies that are often a generation or more behind. By calling out specific projects, the government can target areas for investment and capability development. This is implemented through the research agendas of universities and research institutes, the strategies of state-owned enterprises (SOEs), and through projects, policies and incentives that favor the areas mentioned. An example of such a policy is a grant for 50% of the purchase price of MOCVD tools that are used in the production of LEDs, which are the foundation of energy-efficient solid state lighting. A similar program several years ago addressed the dependence on overseas sources of supply for crystalline polysilicon used in solar cells. Such actions help to ensure that the global production center for these commodities will be in China. Other actions favoring the production and ownership of hybrid electric and pure electric automobiles are designed to help the country become the leading global supplier of electric vehicles and components. In this regard, China recognizes that they are not saddled with legacy infrastructure associated with the manufacture of gasoline powered vehicles, and wants to use their large market to leapfrog to a position of global leadership in electric vehicles. They have already done it in electric bicycles and scooters, cars are next.
The most important driver for the roll-out of plans is through the annual goal setting cycles at all levels in the government. Meeting targets for a city, region, or province, for example, is the path to advancement for officials in the party. Those who do a superlative job get chosen for the prime leadership positions. Those who fail to meet targets get sidetracked, so the motivation is powerful.

I should add that I believe work is already well underway in all of these project areas, as they represent the leading edge of innovation in advanced economies like the U.S. and Europe as well. The 12th Five-Year Plan is a continuation of a long term strategy of capability building that had been in place for decades.
What are the implications for the United States of China's attempt to bolster its high technology industries? First I think we will see increasing market competition for American firms across the board from Chinese companies, with the circumstances in some industries more pressing than others. U.S. firms will not necessarily be global leaders in many fields where we take such leadership as a given. Chinese companies like Huawei will increasingly be world leaders in supplying advanced technology products to world markets. The seeds are already sown.
This means America, and all nations, will increasingly turn to Chinese companies for the purchase of products with high intellectual content, and not just products with high labor content. Huawei supplying the core telecom infrastructure in Iraq is one example, but we will likely see it in other technologies like wind energy, solar, and others. This will make our trade deficit problem even more challenging than it already is.

Second I think we will see increased purchases of Western companies as a path to acquire technology. This has already been taking place, not only in the U.S. but across Europe. I visited a German manufacturer last month that expressed serious concerns over the acquisition by Chinese companies of German companies that controlled key advanced machine tool technologies. These purchases are not limited to SOEs. Geely's acquisition of Volvo is an example of a distress sale in the West that provides key system level capability to a rising private automaker. As the Chinese currency gets stronger, these purchases become easier. That's another downside to our enormous trade deficit. An article on the front page of the Wall Street Journal of June 7, 2011 highlighted this trend. The article pointed out that Chinese companies found it easier to acquire in Europe because of the absence of any kind of strategic review.

FDI like this is not a behavior unique to China of course. European and Japanese companies have long done this, as have U.S. companies in establishing global leadership positions. Look at Roche with Genentech, or Takeda Pharmaceuticals with Millennium or Daiichi Sankyo's purchase of Ranbaxy Laboratories of India. Our trade deficit and the inevitable impact on the dollar have put America on sale.

Third the U.S. must prepare for the eventuality that we will have to source critical military technology abroad as more of our domestic capabilities wither away. Earlier this month I was watching high speed laser drilling of through vias in complex circuit boards used for your favorite smartphones. In China of course, using Japanese tools. What we haven't focused on as a nation yet, with the exception of DOD and DARPA, is the importance of so called dual-use technologies. I remember talking to DARPA in the mid-1990s about this, how commercial off the shelf (COTS) civilian technologies were on a much faster improvement curve than mil-spec. That is even more true today, and this is well understood in China. It is not widely understood here.

With regard to point four, will China's indigenous innovation policies help them? The 1994 Automotive Industrial Policy, part of the ninth five-year plan, is a good role model. That plan sought to force increasingly complete transfers of automotive technology and know-how to China. The plan has had considerable success, with China now equipped with modern production plants and the management capability for running them. As most of us know, today the Chinese auto market is the largest in the world. It is also the most profitable in the world, and it is driven by domestic consumption, not export. But it has also laid the institutional foundation for another large export industry – vehicles and vehicle components. I should add that I feel the Chinese auto industry still has many issues, but it has made huge strides in a fraction of the time taken by Western, Japanese, and Korean counterparts, and it has learned and internalized many of the lessons of the Japanese and particularly the Koreans.

I visited a U.S. wind turbine manufacturer last month. Though they are a technological leader in direct drive permanent magnet designs, they will face increasing competitive pressure, especially as they increasingly have to source critical components in China. Even though transport costs favor local manufacture, I am pessimistic about the long term prospects for U.S. firms in this sector.

Some segments will take more time. I believe it will take years before Chinese companies will be able to design and manufacture the hot section of commercial air transport turbine engines, but they will invest a huge amount trying. Commercial engines require extreme reliability as well as fuel burn performance. The Chinese will make faster progress on the military side.

I believe that China's indigenous innovation policies will help them advance up the value chain to more sophisticated and valuable segments. Progress will not be uniform, but for the last 25 or more years, China's five year plans have targeted the development of capabilities and their goal setting, incentive systems, and long-range thinking have served them extraordinarily well.

What are the implications for the United States should China capture leadership of these seven SEIs? I think China will capture more of the higher value-add segments in many industries. Again, Huawei is a good model here. It has a significant number of essential patents covering LTE in 4G phone systems; we will likely see the pattern repeated in other industries. The value capture could accrue to Chinese companies as well as global multinationals operating in China. We will inevitably see increases in the share of global R&D in those fields pulled into China as well.

But let's not be too harsh on China. This is no different than what happened in Japan over the last 40 years. As I mentioned before, if you want to buy a high-speed two micron laser drill, your choice is among Japanese companies. The same is true for a laser annealing system for polycrystalline silicon. If you want to buy the most advanced optical lithography equipment, your choice is European or Japanese. And remember 70% of the world's semiconductor foundry capacity is in three science parks in Taiwan.

Will China transition from its current export and investment led growth model to a model that calls for increased domestic consumption? This question has been the focus of much that has been written lately. I think we can look again to the 1994 AIP as a role model. As I mentioned earlier, China is now both the largest and its most profitable auto market in the world.

I think it is helpful to take another perspective. In China today, nobody younger than age 35 to 40 years has ever experienced a recession. If you are an urban citizen in China, your standard of living has doubled every six or seven years. At some point in time when that stops, there is a giant problem. The likelihood of an overreaction from the Chinese consumer pulling back is very high. The central government is very worried about such an eventuality, which is why there is an imperative for incremental change, gradual not discontinuous. The economic crisis that started in the United States gave significant pause to Chinese leadership, forcing them to recognize that an overdependence on export to countries like the U.S. put their stability at grave risk. I traveled extensively across Asia at the depths of that crisis. I saw vast capacity underutilization and huge employment challenges. That's the motivation; they don't want to go through that again.

So back to the question: will we see a shift from export-led to domestic consumption led growth? I believe we will, and the proportion will vary across industrial sectors. But China will continue to be an export powerhouse, because so many global supply chains have relocated there. Those supply chains took decades to move, so for many industries there is no short term alternative. That die is cast.

Because of time limitations, I wanted to focus my time on answering the questions posed by the Commission. I will leave some of my recommendations to my written testimony.

In thinking about recommendations, I want to note the circumstances of America's post World War II global leadership. It was built on institutional foundations of global domination of mass production industries, easy access to the world's largest market, and enormous investments made over the prior three quarters of a century in scientific and technical education. Wartime production extended the capabilities of American firms and a faith in science and huge post-war investments in publicly funded scientific research as well as private investments in industrial research fell on fertile ground as American companies used their mass production capabilities to translate inventions into mass market products. We saw it in synthetic fibers and pharmaceuticals, petrochemicals and a host of consumer goods. In fields like electronics and aeronautics, large scale DOD and NASA investments drove crucial demand for the purchase of advanced technology. America produced products that could not be made anywhere else in the world.

Today we live in a different world, where knowledge, know-how, and people flow more freely across borders, and the globalization of production systems expose arbitrage opportunities that are quickly exploited. As many have suggested, we need to continue to innovate, we need to invest in our education systems to produce people who are capable of supporting the advanced capabilities future industries require, and many other obvious things I won't repeat here.

Let me offer a few ideas. We have many leaders in science and technology in this country who want to contribute to the discussion and work on the solution. The National Academies of Sciences, National Academies of Engineering, and the Institute of Medicine produced a highly relevant report, "Rising Above the Gathering Storm," that offered a well thought through set of recommendations. In a follow-up two years later they pointed to how other governments appeared to be taking the initiative to implement the recommendations of the first report, not the United States. As I do my research across Asia, I am struck by the strong technological grounding of leadership in government: in Taiwan, in Korea, in Singapore, and In China. Asian governments rely on technocrats to help them understand policy implications, and to identify the types of capabilities they need to build to support the future paths of their economies. Many leaders in those countries have an engineering or scientific training. We could use our technical leaders in this country more, we certainly have people who want to help.

I also feel that partisan debate is crowding out intelligent discussion of long term planning. We need to identify capabilities that we want to foster and preserve in this country for the century ahead. That is what the Chinese, and other Asian nations have done for many decades. It's a "tragedy of the commons" problem: we know long term investments are vital to the future of the nation, but our focus is short term. Just as the government has to provide infrastructural investments for the common good because private interests cannot, the same applies to

the funding of basic research. Basic research makes significant contributions to the productivity growth of the economy, yet the social returns from basic research are higher than private returns, which is the argument for financing by the taxpayer. Cutting investments now because of an inability to address other structural aspects of our budget only exacerbates the problems for later.

I want to add a cautionary note on military spending. I am certainly not an expert on the military budget, but I do observe that a lot of military spending has funded key market demand pull for the advancement of new technologies. Integrated circuits, composite aerostructures, energy efficient turbine engines, the Internet, code-division multiple access, the global positioning system, and countless other technologies where the U.S. has the lead are examples. We need to take a holistic view, especially with regard to dual-use technologies.

I want to close on a personal note about five year plans. When I was a child, I used to laugh at China's five year plans. The "Great Leap Forward" and others were a big joke to me because of the frequency of perverse outcomes amidst poor central planning choices. But over the last two decades I have come to change my view. Starting with the "863" plan of March 1986, I started to pay more attention. A lot more. Because the Chinese have been diligent in learning from their mistakes and improving their goal setting and measurement systems. Are they perfect? Not by any means. They still often have perverse outcomes. But they work on it every day, and they try to learn from their mistakes.

In this regard, I don't fault them for what they are doing. They are focusing intently on the capabilities required to be competitive in a modern global economy. It would serve us well to do the same thing in this country.

Exhibit 1 China's Seven Strategic Emerging Industries and 35 Projects for Sub-industries included in the 12th Five-year Plan

Energy Saving and Environmental Protection	• High-efficiency and energy saving • Advanced environmental protection • Recycling usage • Reusing waste products
Next-generation IT	• Next-generation mobile communications • Next-generation core Internet equipment • Smart devices • Internet of Things • Convergence of telecom / cable TV / Internet networks • Cloud computing • New Displays • Integrated circuits • High-end software • High-end Servers • Digitization of culture and creative industries
Bio Industries	• Bio-pharmaceuticals • Innovative pharmaceuticals • Biomedicine • Bio-agriculture • Bio-manufacturing • Marine biology
High-end Assembly and Manufacturing Industries	• Aerospace and space industries • Rail and transport • Ocean engineering • Smart assembly
New Energy Sources	• Nuclear power • Solar power • Wind power • Biomass power • Smart power grids
New Materials	• New function materials • Advanced structural materials • High performance composites • Generic base materials
New Energy-Powered Cars	• Electric hybrid cars • Pure electric cars • Fuel cell cars

HEARING CO-CHAIR MULLOY: Thank you, Dr. Shih.
Commissioner Blumenthal.

PANEL I: Discussion, Questions, and Answers

COMMISSIONER BLUMENTHAL: Yes. Thank you, both, for great testimony. Very edifying.

For Dr. Prasad, I had a question about liberalizing of capital accounts, and generally if you're a Chinese household or a Chinese investor, is it still the case that you really can't put your money anywhere? Is this changing, that you can't put your money anywhere except for a mattress, a bank, a Chinese bank, and the stock market? Is that still the case, or is that changing?

DR. PRASAD: That has changed.

COMMISSIONER BLUMENTHAL: The Chinese stock market.

DR. PRASAD: Yes. In fact, Chinese households are allowed to take up to $50,000 a year out. So the capital account has become much more open in terms of the ability to take capital out of the country. The real problem for the average Chinese household is the absence of financial instruments that allow them to do that. So, for instance, you and I can go out and buy an emerging market mutual fund and put our money abroad that way.

COMMISSIONER BLUMENTHAL: I don't have enough money to.

[Laughter.]

DR. PRASAD: All right.

COMMISSIONER BLUMENTHAL: But I understand.

DR. PRASAD: But the average Chinese household, which perhaps has a little more money than you because they're much more diligent about savings.

[Laughter.]

DR. PRASAD: They tend to--

COMMISSIONER BLUMENTHAL: Absolutely.

DR. PRASAD: --not have the ability to take money out essentially because of the lack of financial market development. So the capital account is less the constraint right now rather than just lack of financial market development.

COMMISSIONER BLUMENTHAL: Uh-huh. Okay.

Dr. Shih, I was fascinated by your article and testimony. So the question I have about the actual high-level design that you're talking about, the kind of things that we do here and capture the value here, that potentially China will be a competitor in that area, what are some of the--I mean we have in our briefing books sort of the breakdown of value capture in iPods and iPads and cloud and that sort of thing.

What are the constraints China faces to actually doing that level of design, the highest value captured design, and, particularly, I mean can you do it without intellectual property? Can you do it without--with a certain kind of education system? Can you do it without sort of the freedom to exchange ideas?

DR. SHIH: The way I described their capabilities is the path of development to--there's a path dependency to the development of the capabilities. Because they've engaged in certain types of activities, they're very good at certain types of things.

So, for example, I did one study on a Chinese motorcycle manufacturer that had started by copying, okay, and copying the designs of Japanese manufacturers, but one of the things they lacked, and I think this is something that I see fairly pervasively, is system-level design knowledge and the ability to integrate across boundaries. That's one of the weaknesses in their education system as well, in that they don't produce people who have multidisciplinary capabilities.

This is one of the areas that actually gives me great hope for the United States. If you look at some of the really tremendous innovations that have occurred in the United States over the last number of decades, take the whole biologics and biotech sector, which came out of the human genome program. The human genome program was characterized by cross-disciplinary efforts that combined molecular biologists with geneticists and cell biologists and computer scientists and chemical engineers, and that type of cross-disciplinary thing.

The thing that I see consistently is a shortfall, and this is why I highlighted the Geely acquisition of Volvo. I mean a company like Geely was very good at components, but they weren't good at systems. A company like Volvo is very good at systems. If you wanted to design individual parts, you know, you get that capability by reverse engineering and looking at other things.

It's a system level thing. If you wanted to improve the fuel efficiency of an engine, that takes a different type of capability that incorporates a lot more tacit understanding and a different type of design capabilities. So it is more challenging, and that's an area where I think the U.S. continues to lead.

COMMISSIONER BLUMENTHAL: Okay. Just a comment. I agree with your analysis. So much of the innovation, big innovation in the United States, was driven in the Cold War by DoD spending, and that budget is going way down. Anyway, thanks.

HEARING CO-CHAIR MULLOY: Commissioner Wessel.

COMMISSIONER WESSEL: Thank you, gentlemen, for your testimony, for your continuing guidance to the Commission over many years, so deeply appreciated.

I want to pick up on Commissioner Blumenthal's question. One of the core issues that we're facing here right now, of course, is our continuing weak economic recovery, employment recovery, et cetera.

Dr. Shih, you indicated your increasing admiration over time for China's five-year plans, and I share your admiration. I think the Chinese identify what they want to do, and they're pretty good at doing it. That doesn't mean that there aren't mistakes along the way, but they have the capital and the resolve to address those issues.

You talked about platform integration or design integration, et cetera, and as I look at the maturation of our industry, they started out in the early '80s, for example, in aerospace with McDonnell Douglas and kits being produced in Shanghai; now, with the ARJ21 and the C919, they are at the point of essentially platform integration.

It doesn't mean that there aren't gaps in their production, but they're doing a lot better where they see gaps. Avionics, for example, have just filled the gaps with the GE joint venture. Hot engine technology is still a problem.

But when I look at your list of the seven strategic areas and the list of industries underlying that, I'm having trouble identifying what's left. If the Chinese are successful in those areas, if they have the capital, the desire, and the intent to succeed either through indigenous innovation, through acquisition, by hook or crook, whatever you want to say, as well as the time, what do we do about employment here?

The question about the iPod and the iTouch and the iPad, yes, we may be able to design certain things, but in an employment-based sense where, for the vast majority of our people, does this all lead?

DR. SHIH: Well, I think you raise some very important questions. Certainly, from an education standpoint, one of the things that concerns me is the requirement for training for new skills, radically different skills. When people, if you have a machinist in the auto industry, and you need to train that person for, you know, some of these new high-tech industries, that training is fairly extensive, and it's easy to underestimate the size, the magnitude of that challenge.

I want to key off your comment because I think there's another interesting insight that you highlight there, which is the size of their list and the size of the economy. I was having a conversation with some people in the Ministry of Economic Affairs in a small country, one whose population is less than Chongqing, China, for example, and they've actually been very successful in investing in technology.

It's another one of these Southeast Asian nations that has a strong technocrat core in the government making these policy choices, and one of the things they pointed out was that we're a small country, 23 million people. We don't get to make a lot of bets; right. The ones we make, we

better be right. Whereas, when you look at the list in China, they don't have to hit on all of these.

That's one thing that makes China very similar to the U.S., in the period from the 1870s to 19--well, until actually the post-War era-- because we had a large market, and we could invest in so many of these things.

What it argues for is, and this is the challenge now, investing in long-term basic science because the social returns are much larger than the private returns, and it's just like other infrastructure investments, which necessarily become the responsibility of the state. This is one area where the U.S. continues to lead, and I can cite numerous examples of things that we have done well in the past, and we have to stay the course on that, and also think about revamping our educational objectives, but it's a tough challenge; it's a tough problem.

COMMISSIONER WESSEL: I see my time is up. I'll stop. If there's another round of questions.

HEARING CO-CHAIR MULLOY: Commissioner D'Amato.

COMMISSIONER D'AMATO: Thank you, Mr. Chairman, and thank you, both of you, for very interesting testimony on this critical problem.

I have a two-part question. Dr. Shih, in your list of the seven strategic industries, of course, the first one deals with environmental protection and recycling and reusing waste products, energy savings, and so on. It's been widely documented how serious the Chinese environmental crisis is, particularly their water situation, not only on pollution but scarcity.

Is it your feeling that the targets here, if they're serious about them at the central level, are going to be implementable, more implementable over time at the provincial level?

You talk about the question of political will. This is one where political will is critical because the competing priorities here between environmental protection and industrial growth at the provincial level often have come down on the side of growth in the past at the expense to the environment.

So do you see targets here being implementable at the provincial level? Is this a sea change, a dramatic change in the plan?

And the second part deals with new energy sources, nuclear power, and this will be for both of you.

Noting what the Germans and the Swiss have just done as a reaction of the Japanese crisis, basically putting off for the future nuclear power, there was a hiccup in the Chinese planning for about 20 new plants just after the Japanese crisis, and, then, as I understand it, reporting is that they've gone back to implementing that nuclear power.

But is there some resistance now in the way of developing nuclear power as a result of the Japanese plant, or what is the reaction, new designs, or are they simply going to go as business as usual and not go the

German route in terms of moving toward wind or whatever in trying to replace this rather ambitious plan for nuclear power?

DR. SHIH: Let me first start with the question about targets implementable at a local level. I'm still studying this some more, but one of the sayings in China is "the mountains are high and the emperor is far away," loosely translated, which means the central government can set policy, and then there's provincial and regional and city type of objectives.

And I think this system, which they have been refining over the years--they're getting quite good at it--when they roll out five-year plans, you know, the purpose of that is to really then roll down the targets to all the regions, and they spend a lot of time constructing those. Those targets still have very perverse outcomes.

I can cite one example where a local official had an EVA target, economic value-added, for the power company. And it came to December, and he said I'm going to miss my target because my cost of inputs is higher than my regulated price on the outputs, and the only way I can make my target is to turn off the power to this factory that employs not quite half, well, a factory that employs 60,000 people. So he did.

And so there's still this refining. To me, it's very much like a sales plan when you're running a commissioned sales force. You have to refine those things. I think they will make progress on it, and I don't think capacity is so much an issue, but getting all the economics right.

Let me turn it to you on the nuclear question first.

DR. PRASAD: Yes. My sense is that Chinese industry is hungry for power so I don't think that there is going to be much more than a relatively short hiccup. There is an attempt to look for every possible source of energy.

But going back to your first question, there is a clear understanding among the Chinese leadership that the growth model, especially the investment-heavy growth model, does have very severe environmental consequences, and in a sense, part of the attempt to move towards industries that are cleaner, that have a high-tech focus, is not only to capture the future but also to get away from that destructive model.

In terms of the signals to the local governments, I think Dr. Shih had it exactly right. The planned document, again, is very explicit in terms of telling the local governments to focus on things other than growth, but the problem is that growth is still a very easily measurable criterion, and I sense that the incentives are not going to shift as easily as even the central government would like them to.

COMMISSIONER D'AMATO: Thank you.

HEARING CO-CHAIR MULLOY: Commissioner Slane. Co-Chair Slane.

VICE CHAIRMAN SLANE: As Chinese companies start to go global, are American high-tech companies who are turning over their intellectual

property to these Chinese companies ultimately signing their own death warrant?

DR. SHIH: Let me weigh in on that. I don't think American companies are willingly turning over intellectual property, and you know, I've dug into some of these situations more closely. What happens is when you get companies that are under financial distress or, you know, they fail, their assets go up at auction. Watch carefully what happens to the auction of the Nortel patents that's coming up right now that Google has bid 900 million for, but I don't know that they'll have the wherewithal to bid for that.

But it's more distress type situations. My observation is that most American companies that I'm familiar with who are working this area are quite sensitive to seeding future competition, but they are presented with the dilemma of market access and how do I meter out preferably older technology in exchange for market access because it is too important a market for them to not participate in.

DR. PRASAD: You've hit upon I think what is an essential issue. American companies like many other countries around the world are striking what seems to me a very dangerous Faustian bargain with the Chinese in order to gain, as Dr. Shih put it, market access.

Now this price of market access is very effectively controlled by China, and I think the reality is that even though companies do try to put reasonable safeguards in process, for instance, GE has tried very hard to convince the U.S. government and its shareholders that the attempt to collaborate on civil aviation technology with China will not really lead to a technology transfer, and there is an attempt to try to give slightly older technology, but the Chinese are wise enough to see beyond that, and it's very clear that they are going to be very hard bargainers.

So it is a bargain that I would worry about. And the question is also what the long-term benefits to the U.S. economy are if companies strike the short-term bargain, which ultimately may not be in their long-term interests because even in the short-term, the reality is that a firm that does strike this bargain ends up shifting some of its production, some of its employment generation, to China.

So it's not like the U.S. really benefits either from the firm's market access in China or from the transfer of this property. So I'm not sure that from an overall economic point of view, this is a good bargain for the U.S. as a whole.

VICE CHAIRMAN SLANE: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner Shea.

COMMISSIONER SHEA: Well, thank you both for being here. You're two great witnesses, and I want to say we have some great witnesses throughout the day so I want to compliment the two Co-Chairs.

I have a question for Dr. Shih and a question for Dr. Prasad. I'll start with Dr. Shih. Your article from the Harvard Business Review two years ago had a real effect on me, I have to admit. And, in short, you say that a lot of innovation, including radical innovation, occurs around the manufacturing process, and that innovation and manufacturing are inherently linked.

And you talked in that article about the industrial commons of the United States and how the industrial commons was dissipating and going away in certain regions of the country.

That article was written two years ago, and I was wondering if you could flesh out some of the ideas in the article for us because I think they're important, but also would you change, revise, amend, add to that article? It's been two years.

And Dr. Prasad, you very well, very eloquently explained the 12th Five-Year Program, how China is moving from an investment-led, export-led economy, or hopes to, at least, towards a more consumption-driven economy.

I was just wondering, you briefly touched upon it in your remarks, but could you illuminate for us some of the politics around that? I mean this incredible vested interest in the current system, you mentioned that, particularly along the coastal regions of China, and how is that going to play out? Is it going to be fierce internal battles or what's your view of how those arguments are going to play out?

Dr. Shih.

DR. SHIH: Yes. Thank you.

My colleague Gary Pisano and I are working on a book on that as we do some more in-depth analysis and follow-up on that. But basically the idea is that there is an industrial commons, which includes your supplier networks, your various other resources, your human capital, as well, which is fed by a lot of things, including manufacturing activity.

In fact, if you look at the post-World War II period when the U.S. really dominated the world scene in terms of being able to manufacture things that could not be made anywhere else, it was a combination of institutional foundations that were laid before World War II in terms of education and mass production infrastructure, but it was really the marrying of the fruits of industrial research and scientific research and translating those into mass production. Hence, the very important role that played.

Our observation was that companies would outsource non-strategic complements, and those complements, which weren't important to them, declined because they may have been offshored, for example.

COMMISSIONER SHEA: For cost purposes.

DR. SHIH: For cost purposes, for competitive purposes, and, you know, if you shop in any of the big box stores and you're a manufacturer, you're going to feel those pressures. But as a consequence, things that were

maybe not strategic to you, for example, batteries in consumer electronics devices, could turn out to be strategic in other industries. For example, in energy efficient automobiles.

And it was very hard to foresee the long-term impacts of letting a commons wither away in certain areas, and that was the gist of our thinking on that.

I think that continues to be an important issue. I look at what enabled the U.S. success post-World War II, and it was really that marrying of powerful long-term investments in industrial research with market creation by U.S. government purchases for defense and space in many instances, with an institutional infrastructure of good widespread education in engineering and practical things, as well as mass production industries.

COMMISSIONER SHEA: Do you see more design moving overseas? More of the--

DR. SHIH: Unquestionably. And that's because in many industries, it is important to be close to the manufacturing process where you have to--until a process becomes very mature and very well codified, you can fly over, but this whole push to localize things is driven by the need for faster product cycles. So I do see it.

COMMISSIONER SHEA: Thank you.

Have we got a couple more minutes?

HEARING CO-CHAIR MULLOY: Yes.

DR. PRASAD: So there are lots of cross-subsidies in China. If you think about the banking system, for instance, the fact that there is a ceiling on the deposit rate so that the inflation adjusted deposit rate is negative, and households make negative real returns on their deposits, that is essentially a transfer from the average household through the banks to state enterprises.

So, of course, the state enterprises are very happy about this deal because they get relatively cheap capital and can look very profitable, and they get monopolies to go with that.

In addition, banks have a noncompetitive spread so there's a ceiling on deposit rates, a floor on lending rates, so every renminbi that the banks gets in deposits and lends out makes them money. So the banks are very pleased and the state-owned enterprises are very pleased. It's going to be very difficult to get out of this.

Let's take another example, currency policy. I have an op-ed coming out in tomorrow's Wall Street Journal Asia which basically argues that this is a terrible policy in terms of the fight against inflation, but, on the other hand, it is a big subsidy from the rest of China, particularly the interior provinces, to the coastal provinces which export a lot more.

So the incentives here are very much to hold on to the system as it is. My sense is that it's going to be very difficult to make the progress that is

needed to get over these barriers, and, in particular, I think reform, at least for the next six months, is pretty much dead in its tracks because right now there is the leadership transition coming up early next year, and there is enormous political jockeying going on for the second and lower-tier positions.

So I think nobody is going to try to rustle the waters right now, and there is going to be essentially a stasis in terms of these big reforms that try to get over the interest of vested groups.

COMMISSIONER SHEA: Thank you.

HEARING CO-CHAIR MULLOY: Chairman Reinsch.

CHAIRMAN REINSCH: Thank you.

Dr. Shih, I was reflecting on your exchange with Commissioner Wessel, and you referred to investment in basic science and the need to stay the course. Can you elaborate on what you meant by that?

DR. SHIH: Yes, I think long-term basic science is importance. As I look at policies that have been successful in the past in the United States, they have been focused on basic science as opposed to selecting specific product technologies. You know, we often have this debate--

CHAIRMAN REINSCH: No, I understand that. What does "stay the course" mean?

DR. SHIH: Stay the course means maintaining investments in basic R&D across a broad spectrum.

CHAIRMAN REINSCH: Private or government?

DR. SHIH: Well, government as well as private, but I think government investment in basic science is important because it's very difficult for many private enterprises to do.

CHAIRMAN REINSCH: Okay. That's what I was wanting you to elaborate on.

DR. SHIH: Yes.

CHAIRMAN REINSCH: Thank you.

Dr. Prasad, I was interested in your exchange with Commissioner Slane about companies and their dealing with demands for technology transfer. In thinking about it, and this Commission has addressed this issue before, we may be in a situation where short-term corporate interests and the long-term national interest may not coincide, and we need to figure out how to address that.

But there's also the question of long-term corporate interests, which is, one would think, important too. If you were the CEO of a big company--I don't want to name any particular one--but thinking about the Chinese market and thinking about accessing the Chinese market or any relatively high-growth large market--India would be another good example, and there's more--Brazil, Indonesia coming around the corner--and you look at that and then you look at our economy, a mature, relatively slow-growth

economy, what would you do in that situation if you wanted your company to grow?

DR. PRASAD: Fortunately, I'm an academic so I can think in terms of abstractions, which I can tell you is a luxury. It's a very serious issue for a corporation because, as you correctly pointed out, the growth markets are not so much in the advanced economies anymore. They are in the emerging markets, and the question is what price you pay?

My sense is that for a corporate leader who is really concerned about long-term interests and recognizes that where American corporations can really succeed, as Dr. Shih very nicely put it, is in terms of the innovative process, in terms of the ability to create new ideas and bring them to fruition to the market.

My sense is that trying to turn over technology to China in order to willingly be co-opted in terms of getting market access is a very high price to pay.

The question is whether a company can survive in the short-term, by which I mean a period of say two to three years, without having access to the Chinese market? Because the Chinese are opening up, and it is going to happen as a matter of consequence.

If you think about issues like government procurement, yes, they have not signed on to the WTO part of that, but they are required in a couple of years to start opening up a lot more. And they have now made a commitment to the Government Procurement Agreement, which will start coming into effect over the next couple of years.

Now, for a corporate leader who is worried about quarter-to-quarter earnings, that can be a pretty serious concern. But if I had the ability to stop worrying about the quarter-to-quarter returns, I would, as I mentioned earlier in response to Commissioner Slane's question, be very concerned about this Faustian bargain because it's very difficult given the present intellectual property regime to really guarantee that there will not be technology that is dissipated within China.

CHAIRMAN REINSCH: It's an interesting conundrum. In my day job, I represent these companies, and I can tell you they all recognize the Faustian nature of the bargain. They all understand the dilemma. They all think they're bargaining hard and coming up with the right answer. That may or may not be true, but that's what they think.

I don't think we have people who say, well, I'm giving away the store because I don't have any choice. They're trying their best not to give away the store. That doesn't mean that they succeed.

The easy answer is, of course, well, bargain harder. Don't let the Chinese get away with it. I'm not sure that that's always a viable solution. The alternative may be, and you've implied this, that they simply have to absent themselves from the market unless and until conditions change.

Is that a realistic thing for companies to do?

DR. PRASAD: The big question is in terms of this bargain whether, in fact, they are getting a significant amount of market access, and my sense is that over there, in that dimension, progress has been far less--

CHAIRMAN REINSCH: Yes.

DR. PRASAD: --obvious.

CHAIRMAN REINSCH: That's a fair point.

DR. PRASAD: And that's the question, whether it is, even from a short-term point of view, a wise bargain, and I'm not convinced it is for every company. Of course, I should say every company is convinced that it is getting a good short-term bargain and is protecting its long-term interests.

I worry that in both dimensions, American firms are not doing well by themselves.

CHAIRMAN REINSCH: Thank you.

HEARING CO-CHAIR MULLOY: Thank you both for, one, your really thoughtful written testimony and for the way you're being so forthright in the answers you're giving as we're addressing these.

Mr. Prasad, on page five of your written testimony, you state this: "China continues to intervene massively in foreign exchange markets to counter pressures for renminbi appreciation. China accumulated $448 billion of foreign exchange reserves in 2010, matching the pace in 2009."

So, in other words, the way I understand that, they are massively intervening in foreign exchange markets to maintain an underpriced currency. Is my understanding correct?

DR. PRASAD: You are correct that they're intervening massively, but there is a nuance to this issue. As pointed out in my testimony, the currency has been appreciating relative to the U.S. dollar, but the U.S. dollar has been depreciating against most other major currencies, and that's where the pressure comes from because on a trade-weighted multilateral basis, the renminbi has not really appreciated over the last year.

HEARING CO-CHAIR MULLOY: Yes. So in other words, I see this as they're propping up the value of the dollar by intervening in currency markets and taking those dollars off the market there.

DR. PRASAD: I don't think Chinese intervention is by itself enough to reverse any decline in the dollar. It certainly helps at the margin that the Chinese are willing to bring money to the U.S. by U.S. Treasury bonds.

HEARING CO-CHAIR MULLOY: Yes.

DR. PRASAD: It keeps the U.S. in slightly better shape, but I wouldn't overemphasize that particular dimension. So their major intervention is largely to prop up the Chinese currency rather than the dollar.

HEARING CO-CHAIR MULLOY: To keep their currency underpriced against the dollar.

DR. PRASAD: That's correct. That is the effect of intervening in terms of the dollar market, but, again, they have allowed a fair amount of appreciation against the dollar. So as Secretary Geithner has correctly put it, the currency is not so much a problem for the U.S. anymore as it is a problem for the rest of the world.

HEARING CO-CHAIR MULLOY: Okay. Now, so they have been, my understanding is, again, they have been intervening in currency markets and buying dollars, which then the government has the dollars then, and then they issue yuan to the people who might have earned the dollars as part of their process of managing the value of their currency.

Now, so then the government puts those dollars in U.S. Treasurys. Now, Professor Shih says now they have a huge amount of dollars over there. I guess they got over $3.1 trillion of foreign currency reserves.

DR. PRASAD: That's their total foreign currency reserves. We don't really know how much they hold in U.S. dollars. A reasonable estimate is probably about two-thirds of--

HEARING CO-CHAIR MULLOY: That's what I've read, about two-thirds. So they got a lot of dollars, maybe $2 trillion dollars' worth.

Now, Dr. Shih mentioned that they can begin to buy real assets in this country rather than just buying Treasurys. They can begin to buy real assets in this country, and I saw an article in the Wall Street Journal last week, and there's a lot of concern in Europe now that they are beginning to buy real high technology companies in Europe, and there's concern among the European officials about that.

Is that your understanding?

DR. PRASAD: Almost certainly China is going to be looking for higher value, higher yield assets because they're not getting much of a return on the U.S. government bonds. They are concerned about those. And given the stash of cash that they have, they will almost certainly through their sovereign wealth fund and through other channels, including their own corporations and banks, be looking quite aggressively for investment opportunities in the U.S. and Europe.

Now, one might argue that they are sort of buying up the significant assets of the U.S., and as Dr. Shih pointed out, if the dollar continues to fall, it does look like U.S. assets are up for sale. One different aspect of that is that investment is a good thing. If somebody is willing to invest in this economy because it's a productive economy, that's not necessarily such a bad thing.

The question is whether that is going to come with acquisition of technology that then goes back to China, supports Chinese industries, and thereby deprives the U.S. of employment? So I think one has to view this in totality.

HEARING CO-CHAIR MULLOY: Yes, and that's what I'm going to ask

both of you. The Chinese sovereign wealth fund is a government-owned fund. We traditionally in this country have not wanted our own government owning chunks of our economy.

Now, if we permit the Chinese sovereign wealth fund to begin to buy chunks of American economy, will we not end up on a road then having the Chinese government own chunks of the American economy, something that we have not wanted the American government to do?

DR. PRASAD: I hate to sound like an advocate for the China Investment Corporation, but they have very clear transparent rules that they don't take more than ten percent ownership stakes in any firms. They don't invest in a lot of industries like defense and so on. So, the China Investment Corporation at least has been very, very careful about not treading on political toes.

But the broader thrust of the investment is very much along the lines you're talking about. So if Geely takes over Volvo, or if a Chinese company wants to take over a U.S. company, that I think is more the channel through which you can have Chinese companies or the Chinese government in through the back door, basically buy up U.S. companies.

And there, of course, is where the difficulty issue arises. Is Huawei, for instance, a Chinese government-owned company or a private company? And this is where things become blurry because if it is a private company taking over a U.S. private company, the concern you raise is not an important one.

But if it is, in fact, Huawei acting on behalf of the Chinese government, that is a different issue.

HEARING CO-CHAIR MULLOY: What I'm going to do now is we're going to have another round of questions from the Commissioners because we have that time, and so, Dr. Shih, I'll come back to this when I have my next round.

Thank you.

On the second round, Commissioner Blumenthal. Is there anyone else who hasn't asked a question who wants ask? Commissioner Blumenthal.

COMMISSIONER BLUMENTHAL: Thank you. Thank you, again.

I have to admit I'm really the village idiot on innovation and economic growth except for boning up for this hearing, and I've learned a lot from both of you.

I have four questions for both of you that you can take in any way you'd like. The first has to do with can China get to where Dr. Shih is talking about in terms of high level design, high level value, without a financial market, or a very unsophisticated financial market, where private investors can actually pick and choose what to invest in?

The second is this question about job creation and Chinese investment in the United States. Dr. Shih mentions in his article that the GM bailout

was the wrong way to go, in his view, and the Japanese have created something like 700,000 jobs with their investment. And I don't think you said that, but I read that somewhere else. But the Japanese have built up the auto industry here, essentially creating U.S. jobs.

So Chinese investment in the United States, you know, again, Dr. Shih, you mentioned that U.S. companies are for sale for fire--is that necessarily a bad thing? You know, if we have the right security protections?

And in terms of job creation, I think, you know, I just wonder if the U.S. being a good place to invest is necessarily bad?

The third question is just an understanding of global production networks. It would seem that from everything I've read, it would be a wrenching change for China to get out of its position right now as one stop on the global supply chain and production network, and I know they have plans to do so.

But I've read Steinfeld's book and other people, and the MIT work on industry, and so forth. It just, it seems like they're just part of, right now they're really part, maybe they're increasing some value on a global supply chain, but the way big corporations are working is essentially they stop in Taiwan, they stop in Japan, they stop in China, for lower end.

And I just, can you explain how that global production network would change if China accomplishes its goals or if it's even possible?

DR. SHIH: Okay. So let me talk about the private investment and come back to the other. I was visiting with some people from a local biotech company in Cambridge that was just bought by a large French company for $21 billion. You know who the company is.

And that was also a capability acquisition, but they're investing in growing their capabilities in the United States, similarly as Novartis moved their R&D headquarters from Basel to Cambridge, Mass., some number of years ago; right? I mean I think on balance that was a good thing for the U.S.

So it goes back to what Dr. Prasad was saying, are you going to invest in job creation; are you going to invest in capability development in the U.S.? Or is the investment something where what I want to do is take that know-how and capability and just bring it back to China for the sake of upgrading my capabilities there?

I understand if you were a Chinese company that didn't have system-level capabilities, why you would want to do that. If I were them, I would want to do exactly the same thing. That leads into your question about global production networks.

I've spent a lot of time in Chinese factories, and one of the things that I've seen, especially recently, is first our assumption here is that this is all labor intensive manual assembly stuff. Okay. They've made enormous capital investments in automation, advanced manufacturing technology. I was in a factory three weeks ago that would, it was tremendously

impressive, the capability there was, you know, I watched laser drilling of two micron holes in circuit boards, four million holes per minute, something you can't even do in the U.S.

Those are large, large capital investments, and so they have a willingness to invest, and the investment climate there is very favorable. So I see this as a push to push up the value chain and capture higher value-add stuff, less focus on, you know, on having 65,000 manual labor direct operators working on the assembly line.

So I think it will be more of an evolutionary change, but they're clearly trying to move to higher value-add where they'll capture more value because actually now if you look at many of the products that they make, the value-add there is relatively small. It's mostly imported components, and then re-exported as part of a very complex sequential production system.

DR. PRASAD: Thank you.

Let me just add on the financial market development, it is true that the Chinese financial markets are not very effective at allocating capital towards what seemed like very productive and sensible investments for the economy, and this is where the government's role becomes very important.

If you're a large firm in China, it's not that difficult raising capital. If you're a large state-owned enterprise, it's relatively easy getting bank credit. If you're a large firm, you can also get money from abroad but also raise money through the equity market.

It's the smaller firms that could be on the cutting edge of innovation where the problem arises, and this is where I think the government feels that because it's not been very effective in terms of reforming the banks or getting a broader set of financial markets like corporate bond markets, they have to step in, and that's why I think this becomes a very important part of the plan by saying let's provide incentives, let's find other ways to encourage small firms to innovate and get us going up the value-added chain.

HEARING CO-CHAIR MULLOY: What we're going to do now, there are a number of Commissioners who want a second round. If we could shorten that to three-and-a-half minutes, then I think we can fit everybody in.

So Commissioner Wessel.

COMMISSIONER WESSEL: Thank you.

Although I have several hours of questions, I will limit myself. I'd like to go back to following up on what I had asked before, and again building off the key issue that most Americans are looking at now, which is what's happening with jobs and our economic future.

Dr. Shih, you talked about going up the value chain, and we've had a discussion earlier on the platform integration, et cetera.

What do you see the future of U.S. manufacturing? What do you see

the future of broad-based employment? I agree with you completely. I don't think anyone disagrees that we need to upgrade our basic skills and educational level here, but if China is doing better at integration, creativity, R&D centers are moving there to be closer to the production, from a long-term employment base, again, manufacturing base, what do you see the future for us?

DR. SHIH: I think it's a very important question, and I struggle with that one. When I see essentially all the ibuprofen and acetaminophen in the world and not made in the U.S. either, and I see more and more things, I look at where things come from. I struggle with it.

I look at things where we do complex systems. I think it's important to make things. I think it's really important that Boeing is making the 787 and products in the U.S., and that's an example of complex system integration. They could as well do it in other places.

COMMISSIONER WESSEL: And that is one of the most globally sourced planes, as I recall. You go to their Web site, and they have the map of where everything is produced.

DR. SHIH: Yes. But understand one of the pressures that they have. Everybody in capital goods industries, and I was talking to a German company about this as well, is confronted with the problem of offsets. So a lot of that is driven by offsets. That is not unique to China.

That is, as you know, that's an established practice, and you have to--I would argue that what Boeing is doing in that case is, they are getting paid for system integration. They are getting paid for, if you look at the architecture of a 787, I think the key value-add is this more electric architecture, which I think is very innovative, and they're doing that system integration in the United States, and they're buying a lot of parts from a lot of other places.

I worry about sourcing large composite subassemblies from other areas because I would like to see us do that in the United States--right--because I think it's an important capability. I worry more about the fact that there aren't large U.S. toolmakers who make the composite tape laying equipment and things like that.

I worry about it. I wish there were a simple answer. That's one of the things that Gary and I are struggling with as we think about this.

COMMISSIONER WESSEL: Do you think our government is doing enough?

DR. SHIH: I think what we have to do, and what American companies have to do, is they have to continue to invest in innovation to stay ahead. If you look at, you know, Boeing compared to the C919, or Boeing and Airbus versus the C919, customers continue to pay for those incremental improvements in fuel efficiency that come from having to take a systems-level approach--right.

If you look at it from a systems thinking standpoint, am I taking about having federated systems, which is an approach that an Embraer or a Comac does when they put together a plane, or do I go to integrating flight controls with other engine parameters, that's how I get the ultimate efficiency; right?

So there is a story in my mind for how America has to stay on the leading edge of innovation, and then in order to foster that, what we have to have is an environment that favors that and a market that will pay for those improvements. And I do see encouraging signs in those areas, but it says you have to stay on the leading edge.

COMMISSIONER WESSEL: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner D'Amato, did you have a second round? No. Commissioner, Co-Chair Slane.

VICE CHAIRMAN SLANE: When I look at the laws that the Chinese have passed in the last several years, labor laws, patent laws, antitrust laws, indigenous innovation, and I talk to Chinese government officials, I can't come to any other conclusion but the fact that the Chinese have no intention of turning over their domestic market to foreign companies, and when the day comes that they're able to master the technology, they will ultimately make it very difficult for foreign companies to make a profit.

Would you two agree with that?

DR. PRASAD: Okay. Probably not with such a sweeping characterization, but I think the essence of what you're saying is definitely an important concern, whether Chinese intentions are to provide market access or to basically punt by keeping open this promise of market access, and then when the companies are strong enough not allowing others to compete.

The second issue is even in areas where there is a commitment to open up the markets more, whether those commitments are being implemented or whether administrative barriers are put in place, and the Chinese have been quite effective at making sure that even when there is market access, it comes as part of a bargain either in terms of providing technology or in terms of generating employment within China itself.

So I think it is a pretty serious concern, but, on the other hand, it is a growing consumer market, and I think it's going to be difficult for China to specialize across the board so there is going to be enough of an opportunity for the rest of the world, given the size of the market, given the rate at which it is growing, but I think the concern you're raising is a very valid one.

DR. SHIH: I would probably back off from that a little bit. I just completed a study on the evolution of the patent system in China, and they have a lot of issues around how patents are administered and the whole process. They've just put out a ten-year plan, 2011 to 2020, addressing all

the weaknesses in their patent system and how they're trying to change it.

They have a very large and very complex economy, and this is going to sound a little strange, but it's easy to assume that they have control of all these things, and sometimes I have this vision that you have a central government that is really struggling to get a lot of these things under control. I have this vision of them holding on to the tail of the tiger and just kind of holding on for dear life because it's very complex, and there's a lot of dynamics, as we talked earlier, at the provincial and the local level as well.

I think it is very clear that they are intent on upgrading their economy, just as other economies in the region, Taiwan, Korea, Singapore, Japan, in progression over the last 60 or 70 years have done likewise, and they want to be a modern economy, and they're intent on acquiring the capabilities to do that.

They are leveraging the fact that they have one of the most important markets in the world, and then they create a favorable investment environment.

If you look back in history, there are many other countries who I could point to, including the United States, a century ago, where that was the case.

HEARING CO-CHAIR MULLOY: Chairman Reinsch.

CHAIRMAN REINSCH: Thank you.

Well, Commissioner Wessel stole all my questions. So I'm down to one which is a variation of what he asked except I'm going to ask it of Dr. Prasad rather than Dr. Shih, and that goes back to the exchange we had earlier about the companies, companies making good decisions for themselves as well as for the country, and the dilemma they face, which you outlined, I thought, very elegantly.

What can or should the United States government do to help companies make good decisions in this area?

DR. PRASAD: I actually invoke Dr. Shih, actually, who I think hit upon the key point, which is that American companies are going to face enormous competition in those parts of manufacturing that are still viable in the U.S. and where the U.S. has a competitive advantage as of now. And if you're going to be looking for employment growth, it is going to be a hard-scrabble battle.

In fact, even China is scrambling to get employment from its very rapid output growth. So how does one deal with this? If one thinks about policies, the Chinese have a very different orientation, of course, of getting the government involved, not just by providing incentives but also more directly by providing subsidies, financing, and so forth.

I don't think that's quite the way we want to approach it, but if you think about manufacturing, what sort of skill sets are going to be needed

among our workers in order to support this manufacturing?

It's going to be very difficult to do this if we start shifting away expenditure from issues like infrastructure, both physical and soft, if we start moving away from education expenditures, because ultimately I think if we don't have a really top quality workforce, it's going to be extremely difficult to compete with China.

So in terms of government incentives, I would argue that that's where the bulk of the effort ought to lie, making sure that our industries can work well, that they have the right sort of workforce that can help them compete.

CHAIRMAN REINSCH: Dr. Shih, I assume you agree with that?

DR. SHIH: I agree with that. I just wanted to give another example. You know, last fall, we heard Secretary Chu and the President talk about "a Sputnik moment." And I thought back about Sputnik, which was 1957. I was six years old then. Okay. But I appreciated it, what it was, and I benefited from it over the course of the subsequent 15 years as I went through high school and college.

And what that Sputnik moment was, was a recognition of how could our competitor do something that we weren't capable of doing? I don't think we've had that moment here in the U.S. as much as it was talked about and then passed over.

There needs to be a recognition of what our future looks like if we don't make the investments to grow our capabilities and stay ahead. You know, subsequent to Sputnik, in the United States, we invested heavily in space science and research. Astronauts were heroes. I don't know if you remember that time.

CHAIRMAN REINSCH: I was older than you were--

DR. SHIH: Okay. Well--

CHAIRMAN REINSCH: --in 1957 so, yes, I remember it.

DR. SHIH: You know, astronauts--there was a time when scientists and astronauts and technical people were heroes, right, certainly post-World War II. That was before my time, but I've studied a lot of history in that regard. And these days that's not the case. We ought to think about that.

If you go to look at the Asian governments, not only China, but many, many of them, have a much stronger role for technologists, scientists and engineers in helping to articulate long-term strategies and goals and thinking.

CHAIRMAN REINSCH: Thank you, and thank you for assuming that I'm young enough not to remember that. I appreciate it.

HEARING CO-CHAIR MULLOY: Commissioner Shea.

COMMISSIONER SHEA: Yes. This question is for Dr. Prasad. Could you give us your assessment of the Chinese banking system? The banks as part of the Chinese stimulus program, issued more than a trillion dollars' worth of loans. I think there was a lot of expectation that those loans would not

be repaid. That was on top of previous nonperforming loans. Give your assessment of the Chinese banking system, if you may.

DR. PRASAD: On paper, the Chinese banking system looks like the best in the world because they have enormous levels of capital. Their ratio of nonperforming loans is actually very low right now, and they're making a lot of money. The problem, of course, is that it's not a well-functioning banking system in the traditional sense. It's not allocating capital in the right way, and as I mentioned earlier, there is a government-mandated spread that makes the banks look profitable no matter what they do.

And the reality is that, as you pointed out, many of the problems were swept off the banks' books. Basically a lot of nonperforming loans were taken off the banks' books a few years ago, reducing the nonperforming loan ratio, and they were recapitalized.

So the reason they look good is not because they're doing well, but because the government has essentially put a lot of resources into them. You are correct that problems are coming down the road. Right now, the banks continue to look good because the economy is doing very well. A lot of the money that was pumped out by Chinese banks was to large state-owned enterprises that are either monopolies or are in, quote-unquote, hard industries that are supporting the infrastructure investment boom.

If the infrastructure investment boom slows down, you don't have the demand in industries like steel, cement, aluminum, hard glass, and so on. You start seeing excess capacity building up there. So I think there are lots of problems building up in the banking system. Are they enough to cause a major collapse? Probably not.

The system is under sufficient control, and they have enough resources that they can prevent that from happening, but the banking system is really crucial in terms of what they are hoping to achieve in terms of rebalancing growth, making their economy more efficient, and the banking system is not quite there yet.

COMMISSIONER SHEA: Okay. Thank you very much.

It seems to defy basic economics the way it works, but what you're saying is that the system is so big perhaps that they're able to manage the inefficiencies and the political self-dealing that seems to occur within the banking system?

DR. PRASAD: I've been studying China for just over a decade right now so I cannot pretend to even understand it, but I've thought about the Chinese approach is basically problem divided by GDP, and so long as they can keep GDP growing faster than problem, you're okay.

[Laughter.]

DR. PRASAD: So if you build up a lot of nonperforming loans in order to get your economy continuing to grow at ten percent during a global crisis, you can grow out of the problem. It shouldn't work for very long, and there

are lots of hidden inefficiencies in the system, but I still must tip my hat to the Chinese for pulling off a balancing act that logically should not last so long.

COMMISSIONER SHEA: Thank you very much.

HEARING CO-CHAIR MULLOY: Commissioner Bartholomew.

COMMISSIONER BARTHOLOMEW: Thanks very much. Thank you, gentlemen, for testifying and bringing us your expertise.

While I know we're focusing on China, Dr. Shih, you're clearly a student of history of science in this country, and I'm always struck when we have these discussions about the challenges we face, that we seem to be having a crisis about the public view of science in this country.

We have states where people are fighting about whether evolution should be taught in our schools or not. And I wondered if you had any observations about how we got to this state, or observations about what we can do to get people in this country engaged in understanding that we are going to need science and technology in order to be able to meet these competitive challenges?

DR. SHIH: I wish I had a simple answer for that, but like I said, I think one of the most instructive things is to look at the post-World War II era. Because World War II involved the harnessing of science in many ways, not just the atom bomb. It was things like radar, the proximity fuse, antibiotics, computation, a host of areas.

And I think post-World War II, it's been pointed out by many historians that the American public viewed science as having helped win the war. And that goes to my previous comment about the Sputnik moment and about faith in science.

I'm not sure why there has been this diminishing of confidence or diminishing of the understanding of the importance. Maybe it's more the rise of other things and kind of the diversification of interests and priorities within the country, but I think it goes back to the education system, and I think it's the importance of instilling those types of basic skills.

You know, I worry, I have this battle at the Harvard Business School all the time. In fact, the last battle was only days ago where we were talking about were we going to--pardon my--I shouldn't say this for the record--but dumbing down a particular class, and I think that's, you never see that happen in Asia. I think the strive to excel is really very important, and you don't see that in other areas.

COMMISSIONER BARTHOLOMEW: Dr. Prasad, any observations?

DR. PRASAD: Again, this is a difficult question. I think the hunger for knowledge and the recognition that our technical capabilities are going to be very important in ruling the future, I think is something that is fast becoming ingrained in the Asian societies, and they are benefiting from it. So I certainly worry as an educator myself about what sort of signals we are

sending through our education system if we don't prioritize science and technical skills, which are really going to be critically important for the future.

COMMISSIONER BARTHOLOMEW: Thank you.

HEARING CO-CHAIR MULLOY: Dr. Shih, come back into the issue of the Chinese now have this $3.1 trillion worth of foreign currency reserves. The estimate is probably two trillion in American dollars, and you talk about America for sale. Can you spin out what the concern is?

And, secondly, right now we have something called the Committee on Foreign Investment in the United States that reviews foreign acquisitions of U.S. companies and can block them if they're against our national security interests. But the way I understand Treasury looks at individual transactions, not patterns of acquisitions.

The Canadians have a different approach. They say you have to show that the acquisition is to the net benefit of Canada and Canadians. They have a little different test.

So I just wanted to throw that out. What is your concern when you say America is for sale and China is sitting over there with $2 trillion worth of foreign, of dollars in its foreign currency reserves?

DR. SHIH: Well, let me back up a little and just say as our currency depreciates, assets become obviously less expensive. Yes, if you look at the Wall Street Journal article, I think it was June 7 that talked about how we do have review processes. My point is that Chinese companies, and not just state-owned enterprises, but also private companies, are looking to acquire capabilities.

Now one of the challenging aspects of this is American companies do the same thing. All multinationals are always looking at purchasing capabilities, right, and we see them all the time. So you know it's difficult.

But when you have these huge ongoing trade deficits and you can't earn them back just through services revenue, that money is going to flow to acquiring other things, and I think it's a natural thing towards acquisition of assets. And it's part of the globalization process.

HEARING CO-CHAIR MULLOY: I remember Warren Buffett wrote an article in Fortune magazine in October 2003, in which he said by running these massive trade deficits year after year, we're selling the country out from under us. That's what he saw. The dollars flowing out, some people say these are just paper, and we're getting real things.

But those papers are dollars, claims on the American economy, and the other guy can come back and buy you.

DR. SHIH: That's right. That's exactly--I'm agreeing with that statement exactly. Right.

HEARING CO-CHAIR MULLOY: Okay. Now, the other thing I wanted just an observation. We've talked a lot about forced technology transfer as the

way the Chinese deal with our companies. You want to have market access, give us some technology and know-how.

My understanding is traditional trade theory which treats trade as a win-win for everybody--

DR. SHIH: Uh-huh.

HEARING CO-CHAIR MULLOY: --that doesn't incorporate the idea of the forced technology transfers. When I study Ricardo and those people like that, I don't see anything about forced technology transfers. In fact, they assume capital and technology are fixed.

And so I'm wondering does that, should that lead us to question somewhat what these economists are preaching about trade being always a win-win.

DR. SHIH: Let me say something about forced technology transfers. I'd like to put a little different spin on "forced." Usually they're a matter of choice. They're a matter of choice of whether somebody in China wants to partner with you or do they want to partner with your competitor. Do they want to partner with Boeing or do they want to partner with Airbus? Do they want to partner with GE or do they want to partner with Pratt & Whitney or do they want to partner with Rolls?

And it's those types of choices where they can play multiple companies off against each other. It was no coincidence that Airbus has an assembly line in Tianjin. It's no coincidence that the C919 has a lot of family resemblance to the A320. But, you know, that was a choice that was made to access the world's largest aviation market. Two years ago, the Asia-Pacific region passed the Americas as the largest aviation market. It will be the largest aviation market for commercial aircraft.

So the choice is do you want to play or do you not want to play? And that's the balance that CEOs and those companies have to strike. It's a difficult balance.

HEARING CO-CHAIR MULLOY: Commissioner Wessel, and this will be the last question for this panel, and then we'll take a break from 11 to 11:15, and then we'll start Panel II.

COMMISSIONER WESSEL: I'd like to follow up on Commissioner Mulloy's question and your answer, Dr. Shih, and take this from a hypothetical to reality.

Like Chairman Reinsch, I have another day job as well, and I had a company come to me recently that is concerned about a forced technology transfer to China. Their concern is that they don't believe that our government will stand by them, and that the consequences of failing to transfer that technology will result in legal liability.

Under our, as you well know, fiduciary standards and quarterly reporting and profit incentives, the fact is their goal is to maximize returns for their shareholders, and we tend to do that on a short-term basis, not a

long-term basis.

So without a clear consistent U.S. policy that actively investigates and backs up U.S. companies, is doing forensic work to find this out, we have more and more companies that do have this Faustian choice. In fact, I'd say there may be a legal reason for some of them to do it because of our fiduciary standards in many states.

Can you respond to that? I'm not saying I agree with that, but the fact is more and more companies are basically saying, the Chinese are going to get us one way or another. They're going to either force us to do this, they'll get it some other way, or we're going to lose the market, and it's the fastest growing market in the world.

DR. SHIH: It's really a dilemma. I do see some American companies who have played that market very well, in my estimation. Of course, it's very hard to judge these things because you have to judge them, you know, on a ten, 20, 30 year horizon rather than quarter-to-quarter.

But, you know, I do see some who got into the market early and who are strong players. Again, they have a recognition of striking a balance. As an example, they will use their presence in China as a platform for other emerging markets. I will bring technology in on the high end. I'll develop low end, and it's a question of striking the right balance.

I think it's a difficult balance. In some sense, I was thinking about this the other day, and it's kind of like the tragedy of the commons. This is why people are incented to make short-term choices even though they know about the long-term deleterious effects.

COMMISSIONER WESSEL: And I appreciate that--because time is short--but from a national perspective, we advise Congress. Are our laws or is our national interest being furthered by what's going on? Should we be leaving companies in this role or should there be greater national intervention to ensure that there are market-based signals, meaning that you cannot have these forced technology transfers?

In your case studies, et cetera, do the companies you talk to view the government as being on their side--our government?

DR. SHIH: I have difficulty giving you a crisp answer to that. I do see examples of where technology that was originally funded by the military is therefore restricted on transfer, and nobody will admit it, but it does help those companies.

COMMISSIONER WESSEL: Okay. Thank you.

HEARING CO-CHAIR MULLOY: Well, I just want to finish up by thanking both of you for your terrific testimony and your very thoughtful responses to the Commissioners.

I want to just ask Dr. Prasad if I have a question for the record, would you be willing to take that and give something back in writing?

DR. PRASAD: Yes.

HEARING CO-CHAIR MULLOY: Thank you. Anyone else? Okay. Thank you both, and we'll break now, and we'll pick up again at 11:15 with our second panel.

[Whereupon, a short recess was taken.]

PANEL II: INDIGENOUS INNOVATION

VICE CHAIRMAN SLANE: Thank you.

I'll introduce our panel. Adam Segal is the Ira A. Lipman Senior Fellow for Counterterrorism and National Security Studies at the Council on Foreign Relations, an expert on security issues, technology development, and Chinese domestic and foreign policy. Dr. Segal currently leads study groups on cybersecurity and cyber conflict as well as Asian innovation and technological entrepreneurship.

His recent book, Advantage: How American Innovation Can Overcome the Asian Challenge, looks at the technological rise of Asia. He is a research associate of the National Asia Research Program and was the project director for a CFR-sponsored independent task force on Chinese military modernization.

Mr. John Neuffer is the Vice President for Global Policy and leads ITI's global team to expand market access opportunities for member companies in developed and emerging economies. He directs all of ITI's global government relations, efforts in the arenas of trade, standards and regulatory policy.

In that capacity, he builds strong relationships with foreign governments and industry associations around the world and advances the high-tech industry's trade agenda in Washington.

Before joining ITI in 2007, Neuffer served for two years as Deputy Assistant U.S. Trade Representative for Asia-Pacific Economic Cooperation.

Dr. Dieter Ernst is a Senior Fellow at the East-West Center in Honolulu, Hawaii. Dr. Ernest is a former senior advisor to the Organization for Economic Cooperation and Development in Paris, a former research director of the Berkeley Roundtable on the International Economy, University of California at Berkeley, and a former professor of International Business at the Copenhagen Business School.

Dr. Ernst has co-chaired an advisory committee of the U.S. Social Science Research Council to develop a new program on innovation, business institutions, and governance in Asia. He has also served as scientific advisor to several institutions, among them the Organization of Economic Cooperation and Development, the World Bank, the National Bureau for Asian Research, the U.N. Conference on Trade and Development, and the U.N. Industrial Development Organization. He holds a Ph.D. in economics from the University of Bremen.

Dr. Ernst, we'll start with you

STATEMENT OF DR. DIETER ERNST
SENIOR FELLOW, EAST-WEST CENTER (EWC)
HONOLULU, HI

DR. ERNST: Thank you, Chairman.

And I'm really delighted to have the opportunity to testify today on China's indigenous innovation policies and possible challenges for America. And as you can see from my institution affiliation, this topic is of great interest to the East-West Center.

Based on our research, I would like to start with a simple statement: Fears that China's innovation policy constitutes an immediate threat to U.S. leadership in science and technology are a bit exaggerated.

In my statement, I present data that show China's quite substantial achievements in a relatively short period of time in terms of developing innovative capabilities. These achievements are impressive.

But if you compare these data, and in particular look at data that try to bring out qualitative aspects of innovative capabilities, you see that China still has a very persistent innovation gap relative to the U.S., and even relative to the European Union and Japan.

And so the issue is not an immediate threat to the existing American innovation system. The issue is much more that what we see happening in China and in other emerging economies should be taken as a wake-up call for the U.S., a wake-up call for America. We need to look first, at what are the fundamental issues that we need to address in our trade diplomacy vis-a-vis a country like China or India.

We need to take a hard look and ask: Have we done enough? That was one of the questions I heard in the earlier session. Have we done enough or can we actually do better? And I would argue we can do substantially better even with limited resources, and that's what I'm trying to explain within the written statement. We can do better on the international front with regard to our economic diplomacy.

And the second element, of course, is we need to reconsider what we can do actually at home. What would we need to do in order to build on existing strengths of the American innovation system and adapt it and adjust it to the challenges that we are facing. The fundamental challenge is that not only production but also the development of new technologies, i.e., innovation, are being rapidly internationalized.

In the new world of global production and innovation, even the U.S. can no longer do things on its own. We are part of global production and innovation networks. It's not just China that is part of that. We're also part of those networks. And so that's one important global transformation that

needs to be reflected in our continuous debates about what we as a government and what we as American companies can do to adjust to this changing reality. And part of that new reality, of course, is that we have now new players, who seek to reshape the dynamics of global competition.

China is one of them. And these new players start with very different institutions. They are on a very different level of economic development, and so it shouldn't be a surprise that they use policies that are not in complete compliance, to say the least, with what we consider to be the rules of the game.

This is not a value statement. It's just a statement of fact. I mean their approach, the Chinese approach, is different from ours. And so if we want to achieve something, we really need to understand the subtleties of the Chinese approach, and I would say it's important to understand that there are different stakeholders and actors in China.

These different Chinese actors have conflicting interests. And so maybe a proactive and smart trade diplomacy can play a little bit on this fragmentation of China's innovation system, trying to build coalitions with stakeholders in China that are much more interested in fostering a more open system. This probably would help us strengthen our policy response on trade conflicts that result from China's innovation policy.

In terms of strengthening our domestic innovation system, a defining strength of the American system is that it has thrived on a decentralized market-led system, and that system has produced a treasure trove of innovations.

America's innovation system is still alive and well. However, given the global transformations that I alluded to before, we need to complement this system of decentralized market-led innovation with reinvigorated public-private partnerships like, for instance, DARPA or SBIR, The Small Business Innovation Research program. We need to combine market-led innovation with robust public-private partnerships. If we'd do that, if we really would just look again at a white sheet of paper and identify what we could actually do within the tight limits that we have, I am confident that we could solve some of the challenges that result from China's innovation policy.

Thank you very much.

[The statement follows:]

PREPARED STATEMENT OF DR. DIETER ERNST
SENIOR FELLOW, EAST-WEST CENTER (EWC)
HONOLULU, HI

Mr. Chairman and members of the Commission:

Thank you for the opportunity to testify today on China's "indigenous innovation" policies and possible challenges for America. This issue is of great concern to my organization, the EWC, that seeks to promote better relations and understanding between the US and Asia.

The Commission, since its first report in 2002, has addressed China's innovation policy years before this policy made it into the media headlines. The hearing records contain valuable data and insights for scholars, business people and policy makers. Nevertheless, our understanding of how serious a challenge China's innovation policies are for America is still "work in progress".

My own research examines how China's innovation policy affects innovative capabilities and innovation strategies of Chinese companies. In a study that has just been published, I explore how China uses standardization as a tool for indigenous innovation. Specifically, the study reviews China's recent policy initiatives on four hot button policy issues: i) China's definition of indigenous innovation products; ii) the treatment of foreign companies in government procurement; iii) new regulations for patents included in standards; and iv) China's approach to Information Security Standards and Certification, with a focus on the National Information Assurance Policy Framework Multi-Level Protection Scheme [MLPS][1].

Based on this research, I will argue that China's innovation policy is not a threat to US leadership in science and technology. As demonstrated in the first part of the statement, the US retains a strong lead in overall innovative capacity, and China still has a long way to go to close the innovation gap.

Instead, China's progress in innovation should be seen as a wake-up call for America. Rather than fearing China and blaming it for our problems, we need to focus research and policy debates constructively on how this relationship can be improved. As discussed in parts 2 and 3 of the statement, both the US government and the private sector need to join forces to develop and implement:

- a proactive and smart trade diplomacy that understands the diverse forces and their conflicting agendas that drive China's innovation policy; and
- a national strategy to upgrade America's innovation system in order to cope with the challenge of China's innovation policy from a position of strength.

Both trade diplomacy and national innovation strategy are interrelated, and hence we need to pursue them simultaneously. Corrective action needs to start now, but there is still time to adjust policies and corporate strategies to the new challenges of an increasingly multi-polar global knowledge economy.

1. Evidence on China's progress in innovation and its persistent innovation gap

China's innovation policy has produced massive investments in R&D infrastructure and Higher Education "…on a scale and speed never seen before."[2] Since 2000, China has increased R&D spending roughly 10% each year—a pace the country maintained during the 2008-2009 recession. This sustained commitment to a rapid expansion of R&D sets China apart from the crisis-induced cuts in the US. As a result, China's share in global R&D spending has increased from 9.1% in 2008 to 12.3% in 2010, while the US share has declined from 35.4% to 34.4%. China's share is projected to grow further to 12.9% in 2011, overtaking Japan as the second largest R&D investor. (see **slide 1**[3])

Since 1998, the number of colleges has doubled, and the number of students has more than quintupled, from 1 million in 1997 to ca 6 million in 2007. This contrasts with the situation in the US where state universities are suffering the impact of budget cuts. What matters is that China's domestic science and engineering doctorate awards have increased more than tenfold since the early 1990s, to about 21,000 in 2006, nearing the number of S&E doctorates awarded in the United States (**slide 2**).

Furthermore, China is now one of the four leading countries in science and technology publications, with particular strengths in materials science (especially nano-technology[4]), analytical chemistry, rice genomics, and stem cell biology. China's share in scientific publications and co-authored articles has exploded, catapulting China as the second largest source country behind the US (**slides 3,4**).

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[1] Ernst, D., 2001, *Indigenous Innovation and Globalization – the Challenge for China's Standardization Strategy*, co-published by the University of California Institute on Global Conflict and Cooperation (IGCC), and the East-West Center, June, 122 pages.

[2] Battelle, 2010, *2011 Global R&D Funding Forecast*, p.28, http://www.battelle.org/aboutus/rd/2011.pdf

[3] Please refer to the slides in the Appendix.

[4] China ranks third (after US and Japan) in the number of nanotech publications, and the Chinese Academy of Science is ranked fourth for nano-science citations (after UC Berkeley, MIT and IBM).

Of particular interest is China's patent boom**.** In terms of total patenting activity, China has overtaken Korea and Europe, and is catching-up with the US and Japan[5]. (**Slide 5**) Domestic patent applications by Chinese nationals have overtaken foreign applications since 2003. (**slide 6**) In 2009, Chinese nationals accounted for nearly 90 percent of patent applications in China. This indicates that China's innovation policy has been successful, at least in quantitative terms.

Nearly three quarters of resident applications in China are for *utility model* and *industrial design* patents. (**slide 7**) Some observers consider *utility model* patents as "junk"[6]. However, innovation economists have emphasized that *utility model* patents have played an important role in fostering earlier catching-up processes in Germany, Japan, Korea and Taiwan[7]. What matters is that China's utility model patents facilitate low-budget forms of innovations[8]. An example of this type of successful low-cost innovations are no-name *shanzhai* (unlicensed) handsets that are estimated to have at least a 40 percent share of the Chinese handset market. The situation however is changing fast - the recent Revision of China's Patent Law in October 2009 seeks to discourage utility patents and shifts the emphasis on invention patents.

In fact, a handful of leading Chinese firms and research institutes have moved beyond incremental innovations and are developing portfolios of higher-quality patents (**slides 8 and 9**)[9]. The test flight of China's next-generation stealth fighter J-20 during Defense Secretary Gates' January 2011 China visit highlights the accelerating development of China's defense science, technology, and innovation capabilities.

Another prominent example of innovation progress is that China now has the world's fastest supercomputer at the National Supercomputing Center in Tianjin. (**slide 10**).That machine not only has greater computing capacity than the second ranked US Department of Energy Oak Ridge National Laboratory, but it also consumes considerably less energy. What is interesting is that the Tianjin super computer is an *architectural innovation* that relies on US technology[10]. The Tianjin machine uses energy-saving graphic processors supplied by Nvidia, a chip design company based in Santa Clara/Ca., but the Chinese engineers have changed the way these processors work together.

And yet the gap in innovation capacity persists, and China's leadership is very conscious that the US retains a strong lead in R&D and per capita number of scientists and engineers (**slide 11**), and in patent applications (**slides 12-14**). A telling example is that no Chinese company is among the top 20 global R&D spenders in the IT industry (**slide 15**)[11]. According to WIPO, China owns just two percent of worldwide patents, with 95% of China's patents being in force in China only. And all 15 leading companies with the best record on patent citations are based in the United States (9 in the IT industry).

Root causes for China's persistent innovation gap range from severe quality problems in education to plagiarism in science, and barriers to entrepreneurship and private R&D investment. An important weakness of China's innovation policy are elaborate lists of products and technologies that are constructed to assess compliance with China's standardization and certification requirements. These lists risk being quickly outdated and

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[5] WIPO, 2010, *World Intellectual Property Indicators*, World Intellectual Property Organization, Geneva

[6] McGregor, J., 2010, *China's Drive for 'Indigenous Innovation'. A Web of Industrial Policies*, report commissioned by the US Chamber of Commerce, page 27, https://www.uschamber.com/reports/chinas-drive-indigenous-innovation-web-industrial-policies.

[7] Odagiri, H., A.Goto, A. Sunami, and R.R. Nelson, eds., *Intellectual Property Rights, Development and Catch-Up*, Oxford University Press, Oxford etc.

[8] China's *utility model patents* protect any new technical solution relating to the shape and/or structure of a product, which is fit for practical use. Utility patents offer the same protection (albeit for a shorter time span) as invention patents. But they are quicker and cheaper to obtain since a utility model receives only preliminary examination rather than the full substantive examination of an invention application.

[9] Little is known about what is happening in second-tier Chinese firms and research institutes.A joint research project by the East-West Center and the Institute for Global Conflict and Cooperation (IGGC) at UC San Diego seeks to shed light on this hidden part of China's innovation system.

[10] For a taxonomy of different types of innovation, see Ernst, D., 2009, A New Geography of Knowledge in the Electronics Industry? Asia's Role in Global Innovation Networks. Policy Studies No. 54, August, East-West Center, Honolulu, HI, chapter II.

[11] The 700 largest R&D spenders (mostly large U.S. firms) account for 50% of the world's total R&D expenditures and more than 2/3 of the world's business R&D.

bypassed. Even more important for China's objective to foster indigenous innovation is that such control lists focus on *existing technologies,* rather than on the future innovations that they are designed to promote.

In addition, China's progress in innovation is likely to be stifled by China's policy on Information Security Standards and Certification. In its current form, this policy would create unintended disruptive side effects for the upgrading of China's innovation capacity and could create potentially serious trade conflicts (Ernst, 2011, chapter II).

2. A proactive and smart trade diplomacy

China's innovation policy no doubt has increased technology-related trade conflicts between the US and China, adding further to contentious disputes about exchange rates and foreign direct investment. The US government considers China's innovation policy to be "discriminatory", because it "unfairly favor[s] domestic producers at the expense of foreign firms, … [and]… because of …[its]… threat to global intellectual property protections, fair government procurement policies, market competition and the freedom of U.S. companies to decide how and when to transfer technology."[12] And the US Chamber of Commerce argues that China's innovation policy " …restricts the ability of American companies to access the market and compete in China and around the world by creating advantages for China's state-owned enterprises and state-influenced champions, … [and has]… the potential to undermine significantly the innovative capacity of the American economy in key sectors, and, consequently, harm the competitiveness and livelihood of American business and the workers that they employ."[13]

America has the right to insist on safeguards against forced technology transfer through policies like compulsory licensing, information security standards and certification, and restrictive government procurement policies. For the US government, this implies that there is no escape from the day-to-day grind of trade negotiations. But an activist and smart trade diplomacy requires substantial investments and a much improved capacity of government agencies for monitoring, intelligence gathering and research.

For US business, this implies that it needs to contribute to the necessary funds, given the severe restrictions on public budgets. In addition, US private industry needs to be more forthcoming in providing the US government with information and evidence especially on employment effects (both at home and overseas) of its manufacturing and R&D activities in China, as well as on cyber security violations, IP theft, and other proven costs and damages of Chinese policies.

To be effective, America's trade negotiations with China need to be based on three pillars:

- Understand diverse stakeholders and their conflicting agendas
- Examine what might induce policy adjustments
- Establish shared benefits and reciprocity.

i) Understand diverse stakeholders and their conflicting agendas

It is essential that both the US government and private industry support research on the diverse stakeholders and their conflicting agendas that drive China's innovation policy.

From outside, China's innovation policy often seems to present a homogenous picture of a top-down "model of neo-mercantilist state developmental capitalism."[14] The official message is that China's leadership is convinced that indigenous innovation is the key to removing poverty and for catching up with the US, EU and Japan. Indigenous innovation is considered essential not only for moving beyond the precarious export-oriented growth model. At stake really is the survival of the system. According to government projections, China's economy must grow by more than seven to eight per cent a year if social unrest is to be kept under control[15]. Chinese

[12]Demetrios Marantis, Deputy US Trade Representative, quoted in "UPDATE 2-China trade behavior imperils ties – USTR", at http://www.reuters.com/assets/print?aid=USN1520929420100715.

[13] Testimony by Jeremi Waterman, Senior Director, Greater China at the US Chamber of Commerce before the US International Trade Commission Hearing on *China: Intellectual Property Infringement, Indigenous Innovation Policies, and Frameworks for Measuring the Effects on the US Economy.* (Investigations No. 332-514 and 332-519)", June 15, 2010.

[14] Wolff, Alan Wm., 2011, China's Indigenous Innovation Policy, Testimony before the U.S. China Economic and Security Review Commission Hearing on China's Intellectual Property Rights and Indigenous Innovation Policy, Washington, D.C., May 4: page 3

[15] Quoted in Anderlini, J., 2011, "Beijing must avoid at all cost a giant pop in house prices", *Financial Times*, June 6: p. 4.

leaders understand that export-led growth can no longer guarantee such rapid growth. Hence they place all their bets on indigenous innovation as a catalyst for industrial upgrading.

Such a high-level strategic commitment cannot be easily changed through external pressure, especially for policies that China's leaders think are successful. While "…blaming China for our economic problems …is tempting", this may "ultimately…[be]…an empty gesture."[16] A proactive and smart US trade diplomacy needs to take a closer look at the surprisingly fragmented Chinese innovation system that involves diverse stakeholders with conflicting interests. Identifying those diverse stakeholders might help to improve the leverage of US trade diplomacy.

Three main groups of stakeholders can be distinguished. First, China's exporting industry is a strong supporter of compliance with WTO commitments. This position reflects China's deep integration into global corporate networks of production and innovation[17]. Support for greater compliance with international standards also comes from leading Chinese ICT firms which have accumulated a critical mass of intellectual property rights, like Huawei, ZTE, Lenovo and Haier.

Second, strong support for developing China's indigenous innovation capabilities can be found in research labs, parts of the domestic hi-tech industry with limited export exposure, as well as in the military, the CCP, and large parts of the general public. This coalition of domestic stakeholders is supporting, for instance, policies on patent licensing for standards that seek to reduce licensing fees to foreign patent holders , as embodied initially in the *Draft Rules on Patents included in Standards*, issued by the Standard Administration of China (SAC) in November 2009.

Third, China's security and military establishment plus top leadership echelons view information security and certification regulations as an integral part of China's innovation strategy. Recent policy initiatives (especially China's National Information Assurance Policy Framework Multi-Level Protection scheme [MLPS], issued by the Ministry of Public Security in June 2007; and CNCA's Information Security Testing and Certification Regulations) are driven by fears that China's critical information networks provide an easy "target of attack, sabotage, and terrorism by hostile forces and elements."[18]. A strategic assumption is that control over standards and a strong Chinese information security industry are necessary to protect China's information security.

It is difficult for outsiders to assess which of these three stakeholder coalitions has most leverage in shaping decisions on China's innovation policies. A detailed analysis of recent developments of China's innovation policies finds a fairly consistent pattern of China's response to foreign complaints[19]. In round one, PRC government regulations start out with quite demanding requirements that exceed established international norms. This typically gives rise to a wave of criticism from foreign enterprises and business organizations, but also from Chinese companies that have established a significant position in the international market and that have begun to accumulate a reasonably broad portfolio of intellectual property rights. In response to this criticism, round two then leads to some adjustments in PRC government regulations that combine a selective relaxation of contested requirements with persistent ambiguity.

This raises the question: What is going to happen in further rounds of negotiation? In the run-up to the 18th party congress, there are signs that Chinese policy-makers are moving towards a more dogmatic position on economic policies, political ideology, internal control policies, and geo-strategic and foreign policy positions. It is unclear at this stage whether this shift towards greater dogmatism is a temporary tactical move dictated by the power struggles in the run-up to the party congress. Some observers see a growing role of security considerations

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[16] Additional views of Commissioners Robin Cleveland and William A. Reinsch, in: *2010 Report to Congress of the U.S.-China Economic and Security review Commission*, Washington, D.C., November 2010: p.278

[17] A good proxy indicator for China's integration into global production networks is that foreign-invested enterprises dominate China's manufactured exports - they account for 58% of China's total exports, and 88% of its high-technology exports. As for integration into global innovation networks, China is the third most important offshore R&D location for the 300 top R&D spending multinationals, after the United States and the United Kingdom. Today, China is the largest 'net importer' of R&D, and FIEs account for USD 24.7 billion in R&D spending, about one fourth of China's 2007 R&D spending.

[18] LOU Qingjian. Vice Minister, Ministry of Information Industry, at BOAO Forum 2006, at http://www.boaoforum.org/AC2006/yjgE.asp, accessed July 6, 2010

[19] This is true for China's definition of products that contribute to indigenous innovation; the revision of government procurement regulations; and new regulations for patents included in standards.

in China's innovation policy[20]. Or can we expect, once the congress is over, a strategic shift, albeit very gradually, to greater openness and transparency, as China needs foreign technology and as it needs to adjust to the requirements of its deep integration into the global economy?

ii) What might induce policy adjustments?

To identify areas where adjustments in policy implementation might be possible, the US needs to put in place a process of continuous monitoring and in-depth research on how Chinese innovation policies are evolving over time. An important insight that could structure this research is that "China is approaching the issue of technological leadership from a position of weakness, not strength."[21] I agree. China's main weakness is the persistent innovation gap with the US, the EU and Japan described in part one of this statement. Combined with China's deep integration into international trade and global networks of production and innovation, this provides a powerful rationale for at least tactical compromises with foreign complaints.

This highlights a fundamental dilemma for China that could provide leverage for US trade diplomacy: How can China reconcile the primary objective of strengthening indigenous innovation with the country's leading role in international trade and its deep integration into global corporate networks of production and innovation? And specifically, what compromises are necessary in China's policies and regulations to avoid unintended disruptive effects on China's still critically important export drive?

Overall, I share Scott Kennedy's assessment that, when push comes to shove on how to implement China's indigenous innovation policy, "… the most mercantilist elements are regularly rebuffed, and given the array of interests in favor of a more open innovation strategy, that pattern is unlikely to change….[As]… Chinese companies and officials are engaging – if not fully embracing – global regimes for intellectual property, standards, and even government procurement…, a socialization process is gradually encouraging more constructive behavior so that competition and cooperation occur within the context of a clearer set of boundaries." [22]

iii) Shared benefits and reciprocity

As for the third pillar, US trade negotiations with China have significantly greater chances of success if there is a sharing of benefits that is acceptable to both sides. It is important to emphasize that China's innovation push also provides ample opportunities for cooperation. In fact, both China and the US have a strong interest in deepening cooperation.

It certainly is in America's interest to build coalitions with Chinese stakeholders to foster U.S.-China cooperation on science, technology, and innovation. China's persistent innovation gap implies that China's innovation push creates new markets for American firms as Chinese firms continue to need access to American technology. But implementing such cooperation faces many hurdles. These partnerships need to be on an equal footing, with *reciprocity* of rights and obligations on contentious issues like, for instance, finding the right balance between the protection of intellectual property rights and China's interest in technology diffusion.

Establishing such reciprocity between countries at different stages of development will not be easy. While incumbent industry leaders seek to retain the *status quo*, newcomers like China seek to adjust the old rules to reflect their interests as latecomers. But progress towards adjusted rules of reciprocity should be possible, once the US and China accept that, while their economic systems are different, their economies and innovation systems are interdependent.

China, for instance, ought to acknowledge that America needs safeguards against forced technology transfer through policies like compulsory licensing, information security standards and certification, and restrictive

[20] According to Tai Ming Cheung, "the influence of national security considerations in shaping Chinese innovation and technology development policies is likely to become even more central with China's global rise and the growing demands of its defense establishment." (Cheung, Tai Ming, 2011, The Evolving Relationship Between Technology, Innovation and National Security in China, paper prepared for the conference on the *Political Economy of China's Technology and Innovation Policies*, UC San Diego, June 27-28: p.19).

[21] Levy, Philip I., 2011, *China's Indigenous Innovation Policy and U.S. Interests*, Written testimony before the House Committee on Foreign Affairs Subcommittee on Terrorism, Nonproliferation, and Trade, 9 March: page 8.

[22] Kennedy, S. 2010. "Indigenous Innovation: Not as Scary as It Sounds." *China Economic Quarterly*, September: pages 19 and 20.

government procurement policies. The US, in turn, needs to acknowledge that Chinese firms feel disadvantaged by restrictions on Chinese foreign direct investment, and by restrictions on the export of so-called 'dual-purpose" technologies to China. The US also needs to engage more actively with Chinese concerns for instance about the distribution of benefits of the current rules of patent licensing and of the role of essential patents in critical interoperability standards.

To move towards greater reciprocity, it is necessary to increase the level of trust. While this is not easy, given deeply entrenched fears in both countries, *creative incrementalism* through *learning-by-doi*ng can help to move things forward. As suggested by Michael Borrus in a recent symposium of the National Research Council on Building the 21st Century: U.S.-China Cooperation on Science, Technology, and Innovation: "We need to try some things together, demonstrate mutual gain, and then turn those smaller-scale collaborations into larger collaborations."[23]

3. An integrated national innovation strategy

The US is still way ahead in overall innovation capacity, and fears of China's threat are exaggerated. Trade diplomacy is important, but on its own it is insufficient. China's progress in innovation should be seen as a wake-up call for America. Both the US government and the private sector need to join forces and develop a national strategy to enhance the country's innovative capacity and to create well-paying jobs in research, product development, and engineering, as well as in manufacturing.

Apple's iPod production model provides at best a short-term palliative – once manufacturing moves offshore, higher value jobs in engineering, product development and research are following[24]. To develop viable policies, we need systematic empirical research that provides robust data both on the employment effect of offshore outsourcing by US companies and on job losses in the US that can be attributed directly to discriminatory policies by the Chinese government.

Such research unfortunately is still in an embryonic state.Thanks to the Upjohn Institute for Employment Research and the International Trade Commission (ITC), we now have first rough estimates[25]. Unfortunately, unresolved problems with research methodology constrain the usefulness of these estimates. There is a glaring lack of statistics about how many R&D jobs have been offshored from the United States to China and in what industries. One reason is limited access to corporate employment data. According to a study prepared for the National Bureau of Economic Research, "the U.S. government does not measure the number of jobs offshored."[26] And the latest report of the Congressional Research Service concludes that "…[t]he short- and long-run labor market implications of offshore outsourcing are … unclear."[27]

This makes it difficult to separate out the specific employment impact of China's innovation policy. For instance, in its analysis of the telecommunications industry, the ITC study acknowledges that "it is impossible to attribute U.S. telecommunications trade and employment directly to Chinese indigenous innovation policies." (International Trade Commission, 2011, p.5-27). In addition, it is difficult to analyze the economic impact of China's innovation policy on US employment as China's policies are in flux, remain ambiguous, and are evolving rapidly and often in unpredictable ways[28].

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[23] Symposium on Building the 21st Century: U.S.-China Cooperation on Science, Technology, and Innovation, National Academy of Sciences, Washington, D.C., 18 May 2010

[24] Ernst, D., 2005, "Complexity and Internationalisation of Innovation: Why Is Chip Design Moving to Asia?", *International Journal of Innovation Management*, March: 47–73.

[25] Lazonick, W., 2009, *Sustainable Prosperity in the New Economy? Business Organization and High-tech Employment in the United* States, the Upjohn Institute for Employment Research, Kalamazoo, Michigan; Houseman, Susan, Christopher Kurz, Paul Lengermann and Benjamin Mandel. 2011. "Offshoring Bias in U.S. Manufacturing." Journal of Economic Perspectives 25(2): 111-132: and International Trade Commission, 2011, *China: Effects of Intellectual Property Infringement and Indigenous* Innovation Policies on the US Economy, USITC Publication 4226, May, chapter 5.

[26] Freeman, R.B., 2005, "Does Globalization of the Scientific/Engineering Workforce Threaten U.S. Economic Leadership." *NBER Working Paper 11457*. Cambridge, MA: National Bureau of Economic Research: p. 25

[27] Levine, L., 2011, *Offshoring (or Offshore Outsourcing)and Job Loss Among U.S. Workers*, Congressional Research Services, Washington, D.C.January 21, page 1

[28] "Many policies remain in draft form, many of the implementing regulations for major laws are still not in place, and

Equally important, we need research that facilitates decisions on what government and private business need to do to further enhance America's formidable innovative capacity. US policy debates should focus again on a fundamental question: How can we build on existing strengths to upgrade America's innovation system? In line with the tradition of the American Revolution, America's innovation system is shaped by a unique mix of voluntarism, local control, meritocracy, and individualism and a preference for the private coordination of economic activity. This system has produced a treasure trove of innovations.

There is little doubt that places like Silicon Valley and Route 128, US hotbeds of innovation, remain among the best places to be for high-risk, knowledge intensive innovation activities. This is because such locations typically include a broad portfolio of support services - including legal, finance, and property development - that facilitate rapid adjustments of business models to changing requirements of markets and technology. These are also privileged places to collect strategic market intelligence from the most demanding lead users. Additional strengths of the US innovation system include (1) the presence of the world's leading research universities, (2) an unrivaled exposure to leading-edge management practices for R&D projects, and (3) a high mobility of knowledge workers that facilitates quick and relatively hassle-free knowledge diffusion.

However, barriers to and disincentives for innovation in the US remain aplenty, and we need to find ways to overcome them. For instance, a major challenge to the US innovation system is that federally-funded R&D is under tremendous pressure, while a severe fiscal crisis forces states and local governments to reduce drastically their R&D funding. This matters as US companies are increasingly relying on the federal government and on universities and federal laboratories for basic research[29].

In addition, as US companies need to please their investors and their ever increasing return-on-investment requirements, they are prone to offshore not only manufacturing but also engineering, new product development and research. Following this financial logic, American companies tend to sign agreements in China that are harmful over the long term in order to generate sales during the current or next quarter.

To address these problems, the United States needs a "new national innovation strategy" that combines a reliance on decentralized market forces with reinvigorated public-private partnerships[30]. We also need a debate on how to improve the role of the government as a provider of infrastructure, as an enabler of basic research and as a coordinator and, if necessary, an enforcer of the rules of the game through antitrust policy and smart trade diplomacy.

Many reports have identified key priority areas that need change[31]. This includes overdue improvements in the US education system, so that students are encouraged to study science and technology and to acquire complementary management, interpretative, cross-cultural and other "soft" capabilities[32]. Equally important is a realignment of fiscal incentives to spur early-stage investments in new technologies like low-carbon energy, and reforms in the financial system to improve allocation of capital and create space for patient innovation funds.

According William Brody - then president of Johns Hopkins University and co-chairman of the U.S. Council on Competitiveness's National Innovation Initiative - the United States is facing a serious challenge: "We are losing our collective will to fund basic research… (which) has failed to demonstrate a return on investment that satisfies

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enforcement of most indigenous innovation policies has not yet begun. Much of the concern thus reflects fear of future Chinese policies and of the way new laws may be implemented, and not simply objections to policy actions that the Chinese government has already taken. It remains unclear how the effects of the new policies will play out." International Trade Commission, 2010, China: Intellectual Property Infringement, Indigenous Innovation Policies, and Framework for Measuring the Effects on the US Economy, USITC Publication 4199, November: chapter 5: p. 5-2.

[29] Block, F. and M.R. Keller, 2011, "Where do Innovations Come From? Transformations in the U.S.Economy, 1970-2006", chapter 8 in Block, F. and M.R. Keller, eds., *State of Innovation. The U.S. Government's Role in Technology Development*, Paradigm Publishers, Boulder, London

[30] Successful examples are the DoD's Defense Advanced Research Projects Agency (DARPA) and the Small Business Innovation Research (SBIR) Program administered by the U.S. Small Business Administration.

[31] See, for instance, National Academy of Sciences. 2005, *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Future*. Washington: National Academies Press; and National Science Board, 2010, *Science and Engineering Indicators 2010*, *Vol. I*. Arlington, VA: National Science Foundation.

[32] Lester, R.K. and M. J. Piore, 2004, *Innovation – the Missing Dimension*, Harvard University Press, Cambridge/Mass etc

the ravenous appetite of financial markets for short-term earnings growth."[33] After the global financial crisis of 2008, there is an even greater need for policies that facilitate the supply of patient innovation investment funding.

In the end, America needs to rethink some basic assumptions of its innovation strategy when global corporate networks integrate national production and innovation systems across sector and geographic boundaries and when new players like China enter global competition. In this new multi-polar global economy, what is the appropriate role for national public policies, as globalization becomes ubiquitous, and what are inherent limitations of such policies? How should one define the interests of a country? Are interests of the country and of its corporations aligned, or are there fundamental conflicts?[34]

If employment generation is the primary objective, this implies that manufacturing in America matters. Without a solid manufacturing base, "we will never be able to create the jobs needed to bring us out of this recession, and we will destroy the lives of millions of our citizens and decline as a nation."[35]

I'd like to conclude my statement with a quote from the Commission's 2005 Annual report that could serve as a motto for America's new innovation strategy: "Our public officials must develop policies that give U.S. companies incentives to serve America's national interest by keeping and creating in this country good paying, high tech jobs that sustain high living standards and contribute to the maintenance of our defense industrial and tax bases. This must be a top priority."[36]

VICE CHAIRMAN SLANE: Thank you.

Dr. Segal.

STATEMENT OF DR. ADAM SEGAL
IRA A. LIPMAN SENIOR FELLOW, COUNCIL ON FOREIGN RELATIONS
NEW YORK, NY

DR. SEGAL: Thank you very much. I'd like to thank the Co-Chairs and the other distinguished members of the Commission for the opportunity to speak to you today. It's an honor to be invited.

China's leaders are clearly unhappy with the long-term prospects of remaining "factory to the world." It is energy and labor intensive, it is polluting, and policymakers fear that Chinese companies will remain dependent on and be forced to pay high royalties to foreign technology companies, especially those from the United States and Japan.

In order to break free of this dependence, China has adopted a mix of technology policy--top-down, state-directed efforts--and innovation strategy--a more bottom-up effort to create an environment of technological

[33] As quoted in the *Financial Times*, August 19, 2005.

[34] See, for instance, the testimony of Ralph E. Gomory (a former IBM Senior Vice President of Science and Technology and President Emeritus, Alfred P. Sloan Foundation) to the *U.S.-China Economic and Security Review Commission*, March 24, 2009, who argues that the growing divide in the US labor market indicates that "the interests of many of our global corporations and the interests of the nation have diverged."

[35] Comments by Daniel M. Slane at the February 15 Congressional Briefing on Manufacturing, Job Creation, and Trade with China, at http://supportustradelaws.com/wp-content/uploads/2011/03/Dan-Slane-Feb-15-cong-briefing-remarks.pdf

[36] Additional Views of Commissioner Patrick A. Mulloy, in *2005 Report to Congress of the US-China Economic and Security Commission,* Washington, D.C., November 2005: p.216

entrepreneurship.

While technology policy includes some of the more traditional tools of development such as increasing R&D and subsidizing strategic industries, it is the focus on indigenous innovation that has attracted the most attention. Procurement strategies, competing technology standards, and the failure to protect IPR have all been adopted to create new barriers to entry and to force technology transfer.

The long-term impact of these policies on Chinese innovation capabilities remains uncertain at best. As numerous others have pointed out, it is hard to create innovation from the top down. Active state intervention also creates incentives for reverse engineering and copying as bureaucrats identify what they think is the cutting edge by looking at products that already dominate the market.

In addition, while Chinese policymakers have been successful in building out the hardware of innovation--the quantitative measures that Dr. Ernst mentioned in his testimony--they have been less successful in developing what I call the software of innovation--the political, social, and cultural institutions and understandings that help move ideas from labs to the marketplace.

The impact of these policies on U.S. innovation is also unknown. These policies themselves are rapidly changing as policymakers drop some initiatives and refine others. U.S. firms have publicly and loudly complained about indigenous innovation and the AmCham-China survey shows worry about the future impact of indigenous innovation as a large concern.

But U.S. firms continue to report high returns from China and to expand their investment in the market.

The most important effects of indigenous innovation may not reveal themselves for awhile, and they may be more indirect. Over the last three decades, research has become increasingly collaborative. The locus of innovation has expanded from individual universities and research labs to ecosystems made of networks of firms, capital markets and universities.

These ecosystems are not easily created or maintained. The shift of corporate R&D to China, whether because these firms need to be closer to final customers or because they're reacting to pressure from the Chinese government, could destabilize the interaction of all these other parts of the innovation ecosystem.

The United States must continue to confront China on indigenous innovation. Raising it to the top of the agenda on bilateral summits is important. Multilateral pressure is especially important. Beijing has in the past been willing to step back when several governments, and governments and the private sector, speak with one voice.

Moreover, while the goal of reducing the dependence on the West and creating Chinese champions is widely held among the Chinese leadership,

there are parts of the Chinese bureaucracy that still believe it is possible for China to raise its technological capabilities through more trade-friendly policies.

This is, again, echoing the point that Dr. Ernst made in his comment, that there are multiple stakeholders in the system. These players have not forgotten that opening the world brought foreign investment, access to global customers, and networks and technology transfer.

The challenge is to identify these stakeholders and to strengthen them so they push back against more mercantilist policies.

American leverage on China, however, is bound to be limited so a response at home is essential. So far the dominant response has been more--more R&D and more scientists and engineers--and while more is not a bad start, it will not be enough. We are going to lose an arms race with China. We might spend more than three times what China does on R&D now, but as the Chinese economy continues to grow, they will eventually close that gap.

Rather, we need programs that exploit and strengthen our software of innovation, our social and cultural strengths. This software, in my mind, has three main components: a high tolerance for risk and a culture of entrepreneurship; the ability to conduct cutting-edge interdisciplinary research across institutions and across cultures; and an openness to new ideas and talents no matter where they come from.

Once you begin focusing on software, then you begin to know where to put our limited resources.

So in the area of risk, money has to flow to early start-ups, especially as venture capital shifts away from seed and early-stage capital. Cuts in payroll taxes help lower the cost of hiring, but the government should consider reducing or eliminating capital gains taxes for investments in start-ups.

Government's role in basic research funding is increasingly important, but we're going to have a large debate about how big that investment is going to be as we try to reduce the federal deficit. No matter what the final numbers are, the government should be increasingly funding risky R&D, high-risk/high-return R&D, and ways to do that is to fund younger scientists and also to fund very creative failures.

There has been in my mind too much talk about how many scientists and engineers we have and ramping up the number. The more important issue, I think, is what do those scientists and engineers actually know, how are they trained, and how we actually keep people that are interested in science and engineering in those courses?

About a third of all undergraduate freshmen say that, yes, they are interested in science and engineering, but they drop out after the first year. They drop out either because their courses are too difficult or because they want to become lawyers and get MBAs, and they're afraid that the

engineering course is going to bring down their average, while a political science course, and I say this as a political science Ph.D., is an easy A.

[Laughter.]

DR. SEGAL: But we, in fact, know how to keep people in science and engineering courses. There are a number of universities that do it very well. Carnegie-Mellon, Harvey Mudd, and those courses do it through small classes, by focusing on problems, not by addressing theory first. And those courses keep people in science and engineering.

Finally, openness is essential. The United States must remain the place where the most talented and skilled still yearn to come. Visa regulations must be reformed, and the path to citizenship for skilled immigrants must be made much smoother.

Conversely, the United States must be more actively engaged internationally on the science front. Graduate and Ph.D. students should spend more time abroad. They should spend time in the lab. Now this is basically seen as a year out of your career, but incentives should be changed as this is important for their development.

It's clear that the United States must continue to push back against indigenous innovation and other policies designed to force technology transfer, but there remain some great weaknesses in the Chinese system. As long as the United States maintains its comparative advantage--an open and flexible culture and a web of institutions and attitudes that move ideas from the lab to the marketplace--it can prosper and play a dynamic role in a world of globalized innovation.

Thank you.

[The written statement follows:]

PREPARED STATEMENT OF DR. ADAM SEGAL
IRA A. LIPMAN SENIOR FELLOW, COUNCIL ON FOREIGN RELATIONS
NEW YORK, NY

I would like to thank the co-chairs and the other distinguished members of the Commission for the opportunity to speak to you today. It is an honor to be invited.

China's leaders are clearly unhappy with the long-term prospects of remaining "factory to the world." It is energy and labor-intensive and costs are rising. It is polluting. And policymakers fear that Chinese companies will remain dependent on and be forced to pay high royalties to foreign technology companies.[37]

Chinese firms, using their low labor cost advantage, have succeeded as manufacturers and assemblers of IT products; yet internationally competitive standards and platforms, which require large fixed outlays and deep technological expertise that can only be acquired over time, have so far remained out of reach. Chinese policymakers fear that they will remain trapped in this position. In the words of one Chinese commentary:

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[37] Adam Segal, "China's Innovation Wall," *Foreign Affairs*, September 28, 2010, http://www.foreignaffairs.com/articles/66753/adam-segal/chinas-innovation-wall

"Chinese companies lack core technology, depend on foreign companies for crucial parts, are at the lower end or the middle range of the global industrial chain, rely on multinational companies for technological support and rely on the global sales chain…"[38]

Moreover, Chinese analysts and policymakers have become increasingly frustrated with the level of spill-over and technology transfer from Western R&D. Some critics claim that foreign firms "crowd out" domestic firms in the market for highly skilled labor, monopolize technology standards, and thwart technology transfer and knowledge spillovers.[39] Reflecting an aggrieved nationalistic feeling about this relationship, articles in the Chinese press complain that foreign companies own the technology used to enter Chinese characters—"the embodiment of five thousand years of Chinese civilization," in the description of one Chinese commentator—on a cell phone keypad. So with each of the tens of millions of cell phones sold in China, a payment is made to a foreign company for the use of character input technology.[40]

The Chinese phrase for indigenous innovation, *zizhu chuangxin*, was introduced in a 2006 state-issued report, "Guidelines on National Medium- and Long-term Program for Science and Technology Development." The report contained a mix of top-down, state-directed policies alongside bottom-up efforts meant to foster technological innovation. The top-down measures echo China's old state planning system. They include raising the share of GDP dedicated to R&D to 2.5 percent by 2020 from 1.5 percent today, and investing in eighteen science and engineering "megaprojects", including initiatives to develop nanotechnology, new drugs, high-end generic microchips, and aircraft.

The 12th Five Year Plan (2011-2015) calls for "cultivating and developing" seven strategic industries: alternative energy, biotechnology, information technology, high-end equipment manufacturing, advanced materials, alternative-fuel cars, and energy-saving and environmental technologies. While it is doubtful that the final numbers will be this large (or that the sectors themselves could absorb such investment), public reports suggest that the government is considering investments of up to $1.5 trillion in these strategic industries.[41]

Indigenous Innovation

These more traditional S&T policies have been accompanied by efforts to encourage, and in some instances, force foreign companies to transfer technology to Chinese firms. One of the most comprehensive efforts to create technological autonomy, or at the very least reduce the payment of licensing fees to foreign companies, has been the development of competing technology standards. As a phrase popular in technology circles in China puts it, "third-class companies make products, second-class companies develop technology, first-class companies set standards." In December 2003, for example, the government announced that WLAN Authentication and Privacy Infrastructure, or WAPI, would be the mandatory standard for any wireless product sold in China. The Chinese standard essentially came out of nowhere, mandated by a government agency without consultation with private companies, Chinese or foreign. In addition, Beijing's decision—due to "national security concerns"—not to share an algorithm included in WAPI would have forced Intel and other foreign companies to cooperate with one of twenty-four Chinese vendors licensed to develop the competing standard.

While standards battles have for the moment become less prominent, the Chinese state has found other policy

[38] From Suttmeier, R. P. and X. Yao, "China's Post-WTO Technology Policy: Standards, Software, And the Changing Nature of Techno-Nationalism," National Bureau of Asian Research special report, May 2004, http://www.nbr.org/publications/issue.aspx?id=61

[39] Zhongping Lin, "The Influence of MNCs upon China's Independent Innovation Capacity," *China Venture Capital* (*Zhong Guo Ke Ji Tou Zi)*, May 2006, 40–43, http://cvcht.dooland.com/

[40] Adam Segal, *Advantage: How American Innovation Can Overcome the Asian Challenge*, New York: W. W. Norton & Company, 2011.

[41] "China Mulls $1.5t Boost for Strategic Industries," *China Daily*, December 3, 2010, http://www.chinadaily.com.cn/china/2010-12/03/content_11648336.htm

tools to pursue indigenous innovation. In 2009, for example, the Chinese government announced that companies that wanted to be included as recognized vendors in the government's product procurement catalog would have to demonstrate that their products included indigenous innovation and were completely free of foreign intellectual property. Yet, since research and development is a global, collaborative process, no individual high-tech product is completely independent of technology from outside of China. As a result, in April 2010, China ordered several high-tech companies to turn over the encryption codes to their smart cards, Internet routers, and other technology products if they wanted to be listed in the procurement catalog.

In addition, constantly in the background is Beijing's failure to protect intellectual property rights [IPR] in the Chinese market, leading to massive theft and piracy. As U.S. Chamber of Commerce Senior Director for Greater China Jeremie Waterman testified before the International Trade Commission in June 2010, this weak legal environment allows Beijing to "intervene in the market for IP [and] help its own companies 're-innovate' competing IPR as a substitute to American and other foreign technologies."[42]

While these top-down efforts to force technology transfer have garnered the most attention in the United States, Japan, and Europe, the MLP also promotes what can be called innovation strategy—more bottom-up, multifaceted efforts to create a business environment supportive of innovation and entrepreneurship. The bottom-up efforts draw from the experience of Silicon Valley and revolve around university-industry collaboration, venture capital, and small-start-ups. At least eight provisions directly or indirectly concern small and medium-sized technology businesses. The guidelines reduced the enterprise income tax for high-tech firms that invest heavily in R&D and provided financial support through soft bank loans.

In these sections, the report also promises greater protection for intellectual property rights: "we must build a system of rule of law," the report states, "that respects and safeguards IPR, promotes consciousness of IRP throughout the entire country, raises standards for IPR management, increases the strength of IPR protection, and cracks down heavily on all kinds of behavior that infringes on IPR, according to the law."

If the guidelines are of two minds on policy options, they are clear on ultimate objectives: China will become "an innovative nation in the next 15 years and a world power in science and technology fields by the middle of the 21st century." By 2020, the report states, China should reduce its "degree of dependence on technology from other countries to 30 percent or less" (down from 50 percent today as measured by the spending on technology imports as a share of the sum of domestic research and development (R&D) funding plus technology imports). Noting that reliance on other countries—especially the United States and Japan—is a threat to Chinese national and economic security, the paper calls for China not to purchase any "core technologies in key fields that affect the lifeblood of the national economy and national security" such as next generation Internet technologies, high-end numerically controlled machine tools, and high resolution earth observation systems.

Software and Hardware of Innovation

The impact of these policies on Chinese capabilities remains uncertain at best. While China has shot up the patent list, becoming the world leader in filing in 2011, many of the patents filed are for new designs or appearance, and have little to do with improvements in product or process. A large number of the patents are what the Chinese call utility patents, which are easier to prepare and file and do not undergo substantial review. Government policies have inflated the number of filings by subsidizing the filing fees for inventors, providing tax breaks for companies that file, and changing *hukou* status (resident permits) for inventors. Moreover, these filings have very little to do with innovation and are about positioning Chinese companies to sue foreign firms as they enter local markets for alleged patent infringement.

[42] Jeremie Waterman, "China: Intellectual Property Infringement, Indigenous Innovation Policies, and Frameworks for Measuring the Effects on the U.S. Economy," Testimony before the U.S. International Trade Commission, June 15, 2010, http://www.itcblog.com/wp-content/uploads/2010/06/watermancomments.pdf

The efforts to define and develop Chinese standards have also produced mixed results. For example, the Chinese third generation cell phone standard, TD-SCDMA, has serious technological shortcomings; it is slower and less stable than W-CDMA. Rollout has continually been delayed and two of the three Chinese mobile companies, China Telecom and China Unicom, were allowed to use international technologies. China Mobile, the company required to use TD-SCDMA, has been trying to move to TD-LTE, the fourth generation technology based on international standards, as quickly as possible.

Overall, the Chinese approach is likely to be counterproductive. It is difficult to drive innovation with a top-down technology policy that picks national champions and critical technologies, and fails to protect intellectual property. Most important, the software of innovation—the social, political, and cultural institutions and understandings that help move ideas from lab to marketplace—remain undeveloped. The inputs of innovation are not the same as the process of innovation. Labs can be built, money invested, prominent professors recruited, and policies developed. But without respect for the rule of law and intellectual property rights, as well as a culture of individual initiative and openness, these steps will not produce the intended results.

The innovation process can very schematically be described as requiring new ideas, talent, and firms, and policies that foster and regulate the preceding three steps. For each, there are significant gaps between the build-out of physical infrastructure and the development of the institutions and practices of innovation. Within government labs, for example, strong bureaucratic control of research agendas and professional careers as well as deference toward authority makes it difficult to create a culture of individual initiative and creativity. While it was the attacks on human rights dissidents and the theft of Google's intellectual property that garnered the most attention outside of China, those hurt the most by the hacking may have been Chinese scientists. Of the 784 scientists who responded to a survey conducted by *Nature*, 84 percent said that Google's departure would "somewhat or significantly" hamper their research; 78 percent said it would "somewhat or significantly" affect international collaboration.[43]

There has been a significant explosion of entrepreneurship and new firm creation. But the incentives remain to copy successful business models and technologies from the West and apply them to the local market. Start-ups and private companies have difficulty acquiring capital, and they often turn to local governments and technology plans for funding. As a result, they must often pursue the technologies and development trajectories of interest to government bureaucrats. These officials are likely to identify the cutting-edge with already existing products, creating incentives for reverse engineering and copying.

Impact on American Economy

Despite the limited impact of Chinese policies on raising indigenous capabilities, American firms clearly view them as a barrier to doing business. In AmCham-China's 2011 Business Climate Survey, 40 percent of respondents believed indigenous innovation policies will hurt their business in the future; 26 percent said they had already lost business because of the policies.[44] It is worth noting, however, that more view indigenous innovation as a future problem, and that the degree of hurt must be tolerable for American companies for they report both increased revenues and profits over 2009 and plans to continue investment in the China market. Also as Philip Levy of the American Enterprise Institute notes, the economic implications of these policies is difficult to gauge because they are changing so rapidly; they are often presented in draft form and then revised after complaints from the foreign and domestic business communities.[45]

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[43] Jane Qiu, "A Land Without Google?" *Nature* 463 (2010): 1012-1013, http://www.nature.com/news/2010/100224/full/4631012a.html

[44] "2011 China Business Climate Survey," The American Chamber of Commerce in the People's Republic of China, http://www.futureofuschinatrade.com/sites/default/files/american-chamber-of-commerce-china-business-climate-survey.pdf

[45] Philip I. Levy, "China's Indigenous Innovation Policy and U.S. Interests," Testimony Before the House Committee on Foreign

The more important effects of indigenous innovation may not reveal themselves for a while and they may be more indirect. Over the last three decades, research has become increasingly collaborative, involving suppliers, customers, and university labs. A survey conducted by the Information Technology and Innovation Foundation, for example, found that over the last thirty-five years, fewer commercial innovations were the product of large firms acting independently.[46] In addition, independent corporate labs working on "blue sky" questions are disappearing. As research has gone collaborative, the locus of innovation has expanded from individual universities and corporate labs to ecosystems made up of networks of technology firms, capital markets, and research universities.

These ecosystems are not easily created or maintained. Remove any one component—manufacturing or R&D—from the system and you risk destabilizing the complex interactions between firms that drive technological discovery in the United States. The shift of corporate R&D to China, whether because firms need to be closer to final customers or they are responding to pressure from Chinese policymakers, could destabilize the interaction of all the other parts of the innovation ecosystem. The real impact of indigenous innovation policies may not be in raising Chinese capabilities, but in throttling American ones.

U.S. Response

It is important to remember that indigenous innovation is more of an objective than a specific set of policies. One set of policies may be replaced by another because the goals of reducing dependence on foreign technology, producing Chinese intellectual property rights, and creating Chinese technology champions are deeply and widely held. Already the focus on standards has been complemented by the use of procurement strategies, and moving forward some other set of policies may replace procurement. In the end, American policy begins to look like a game of whac-a-mole, beating down one initiative only to see another one pop up.

While seemingly in the minority, there are parts of the Chinese bureaucracy, however, that still believe it possible for China to raise its technological capabilities through more trade-friendly policies. They have not forgotten that opening to the world brought foreign investment, access to global customers and distribution networks, and technology transfer. Moreover, as Chinese firms look to expand abroad, they may also be an ally in the fight against indigenous innovation. Their future is in global, not in balkanized technology markets. The challenge is to identify these actors and then strengthen them as they push back against more mercantilist policies.

The United States must continue to confront China on indigenous innovation. Raising it to the top of the agenda at bilateral summits is important, for it signals intent and interest. A strong display of concern from the American side at the January 2011 meeting helped produce a commitment to delink government procurement strategy from innovation policies, though it is too early to know if China will follow through on the promise. Multilateral pressure is especially important; Japan and the European Union are pressing China on the same set of issues and Beijing has in the past been willing to step back when several governments, and government and the private sector, speak with one voice.

Because the leverage the United States has over China is bound to be small, a response at home is also essential. The United States needs to exploit its software, its social and cultural strengths: the ability to conduct cutting-edge, interdisciplinary research; recognize new markets and consumer demands; manage across time, distance, and culture; tolerate risk and support entrepreneurship; and welcome new ideas and talent no matter what their origin.

Affairs, Subcommittee on Terrorism, Nonproliferation, and Trade, March 9, 2011, http://foreignaffairs.house.gov/112/lev030911.pdf

[46] Adam Segal, *Advantage: How American Innovation Can Overcome the Asian Challenge*, New York: W. W. Norton & Company, 2011.

Money has to flow to early-stage start-ups. Under the Obama Administration's "Startup America" Initiative, the government will launch a $1 billion early-stage innovation fund that will provide a 1:1 match to private capital raised by early stage funds. Cuts in payroll taxes help lower the cost of hiring new workers, but the government should also consider reducing or eliminating capital gains taxes for investments in start-ups.

The government's role in funding basic research has become even more important as business has shifted away from funding "blue sky projects with uncertain immediate commercial use but with the promise of big breakthroughs.[47] Alcatel-Lucent, for example, announced in 2008 that Bell Labs—responsible for six Nobel Prizes as well as the invention of the transistor, the laser, and numerous other communication and computer technologies—would no longer conduct basic research in material physics and semiconductors, but instead would focus on networking, high-speed electronics, wireless, software, and other commercial applications.

The Obama administration has signaled its intention to try and fill this gap with federal funds. While the FY 2012 budget proposes $148.9 billion for federal research agencies, a slight decrease (0.3 percent) from FY 2010, its 10.6 percent increase ($66.9 billion) for basic and applied research will produce the largest federal research investment in real terms in history, according to the American Association for Advancement of Science.[48] Federal investment in R&D, however, remains hostage to the larger political debate about how to reduce spending and the deficit.

No matter the final numbers, it is essential that the money funds high-risk, high-return R&D. Hard times make scientists more conservative, as they seek to secure grants by writing proposals that extend what they already know, not striving toward something new. To counteract the tendency to stay in comfortable territory, more money should be directed to early-career grants and to support well-designed failures—ideas that push the envelope of accepted paradigms.

The results of federally funded R&D are widely available and thus mobile. It is entirely possible that companies can develop the findings of basic research to create high-wage jobs outside of the United States. The R&D tax credit can be used to ground these results locally by forging ties among industry, universities, and government. Research consortia involving three companies or investments in collaborative research at a federal research laboratory or an American university could be offered a tax break equal to 20 percent of their R&D spending.

There has also been too much focus on how many scientists and engineers the United States educates as opposed to how they are trained and what they need to know. Many future breakthroughs are likely to emerge from multidisciplinary work at the nexus of biology, physics, computer science, and mathematics. As a result, young entrepreneurs must be familiar with several different branches of the sciences, as well as be able to draw insights from design, psychology, economics, and anthropology.

Openness is essential, and the United States must remain the place where the most talented and skilled still yearn to come. Visa regulations must be reformed and the path to citizenship for highly-skilled immigrants made much smoother.

Conclusion

While many of the policies that fall under the rubric of indigenous innovation clearly make it more difficult for American companies to operate in China, the long-term impact on Chinese competitiveness remains uncertain at best. It is difficult to create an environment that rewards individual initiative and creative risk-taking from the top down. Moreover, the focus on reducing dependence on the advanced economies means that Chinese officials

[47] Adam Segal, "U.S. Innovation and Economic Recovery," Council on Foreign Relations, June 6, 2011, http://www.cfr.org/economics/us-innovation-economic-recovery/p25198

[48] "AAAS Report XXXVI: Research and Development FY 2012," American Association for the Advancement of Science, 2011, http://www.aaas.org/spp/rd/rdreport2012/12pch00high.pdf

focus on known technologies—the latest Intel microprocessor or Nvidia graphic processing unit—often encouraging copying and reverse engineering, not new developments.

Despite the limited efficacy of these policies, the United States must still push back against them. Protests have proven most effective when the pressure is multilateral and not just from Washington, and when governments and businesses speak with one voice. Still, policymakers should expect movement from Beijing to be limited—Chinese policymakers are deeply committed to the idea of technological independence, and one set of policies is likely to be replaced with another.

This means that changes at home are essential. As long as the United States maintains its comparative advantage—an open and flexible culture and a web of institutions, attitudes, and relations that move ideas from the lab to the marketplace—it can prosper and play a dynamic role in the new world of globalized innovation.

VICE CHAIRMAN SLANE: Thank you.

Mr. Neuffer.

STATEMENT OF MR. JOHN NEUFFER
VICE PRESIDENT FOR GLOBAL POLICY, INFORMATION TECHNOLOGY INDUSTRY COUNCIL (ITI)
WASHINGTON, DC

MR. NEUFFER: Vice Chairman Slane, Chairman Reinsch, other Commissioners, thanks so much for inviting me here today.

This is a very timely and important topic, especially for the tech industry, and ITI, the Information Technology Industry Council, welcomes the opportunity to present some views today on indigenous innovation and industrial policies.

ITI member companies represent some of the biggest global leaders in tech. That's both goods, services and software. China is, of course, one of our most important markets, a huge market and growing market. Yet, China represents some of the biggest trade challenges we have around the world and including many market access barriers, often expressed as non-tariff barriers.

To be sure, we welcome an innovative China. We welcome a China that's trying to have a more innovative economy. However, this so-called "indigenous innovation" policy is rife with challenges and shortcomings.

So what I'd like to do today is present on-the-ground real-time problems we're having in China to help set the table for the discussion.

Our primary challenges relate to China's approach to spurring domestic innovation through policies that both veer from global norms and are too often patently discriminatory. At its core, this is a problem of market access for us, though there are broader strategic implications that come into play as well.

China's indigenous innovation policies have been around for a long time, but more recently these policies have come at the expense of foreign

players. One of the most notable of these policies that popped up about a year ago was this idea to establish national catalogues of products, indigenous innovation products, that would receive significant preferences for government procurement, a massive market for our companies. And, this policy included an unprecedented use of domestic IP as a condition for market access, which made it almost impossible for our companies to compete in this GP market.

So China in the face of tremendous pressure from the United States, Japan, and Europe--both private sector and government, backed away from this policy. Fortunately, our objective now is to make sure that really happens.

But indigenous innovation policies aren't limited to this one misguided effort to establish these product catalogues, but also in the area of IPR. We've all heard about China being a persistent offender when it comes to IPR infringement.

The U.S. ITC has just concluded a very good report, putting some numbers on that, in terms of what it means for American jobs and the U.S. economy. Standards is another big area, with China going off and developing its own unique standards that aren't consistent with global standards, not creating significant opportunities for foreign players to be part of the development of those standards. We've seen a few years ago a big WAPI battle which involved the standard for wireless encryption that was pushed back. Now it's become a de facto standard, so when you buy a mobile handset in China now, it has to have both a WAPI chip in it and a WiFi chip in it.

There's another looming problem that comes in another acronym, which is TCM, which is Trusted Cryptography Module. It's basically the chips in computers that are increasingly being used to manage security functions. China has created its own chip with its own standard, and there's risk that there will be increasing requirements to put these chips in all products, all computers made in China.

Another area, conformity assessment. There's a whole range of testing and certification requirements being placed on our companies--some of them unnecessary. Others that veer from global approaches, others that we consider to be invasive, asking for way too much information than is necessary. And if there's a big area on the horizon that we're troubled by, it's this question of critical infrastructure and protecting your critical infrastructure.

We all struggle with this. It's a very big area. The Chinese have adopted something called the "Multi-Level Protection Scheme." As this thing slowly rolls out, which it's begun to do, it includes domestic intellectual property requirements that will keep U.S. companies and foreign companies largely out of participating in critical infrastructure

procurements, and that's both in the commercial sector and in the government sector.

So the two common threads running through our challenges in China are policies that advantage domestic companies at the expense of foreign players and aim to force technology transfers.

How do we address these myriad transfers, these myriad challenges? It's going to require continued private sector-public cooperation, which we've been doing in the past. It needs to continue going forward. It's got to be high level with S&ED kinds of dialogues to attack the overarching problem, in addition to innovation, and it's got to be low level in the trenches with the JCCT.

It also has to be in cooperation with other players around the world, like-minded players in Japan and Europe, and it has to be honest and firm. I think we don't do anyone a favor unless we tell the Chinese exactly what our problems are and how we think they can be solved.

So we need, and the other piece of it that was identified by Dr. Segal, is we need to get our own house in order, too, in terms of tax, trade, and talent policies. It's critical that we need to do more work here to be more competitive globally, not just vis-a-vis the Chinese, but others.

So we must get the China calculus right. This market is too important for the United States and the rest of the world. As mentioned by Dr. Ernst, China is not a monolith. There are important Chinese in the private sector and public sectors that get that China needs to innovate in a way that we all understand and can recognize, and it needs to integrate itself into the global economy.

We need to work more effectively in our policy expressions to bring these people in and to empower them and help the Chinese government make some good choices. I'm confident that we can successfully chart this course. Too much is at stake to do otherwise.

Thank you.

[The statement follows on page 79:]

ITI Testimony before the U.S.-China Economic and Security Review Commission

Hearing on China's Five Year Plan, Indigenous Innovation and Technology Transfers, and Outsourcing

Presented by:
John Neuffer, Vice President for Global Policy
Information Technology Industry Council (ITI)

June 15, 2011

The Information Technology Industry Council (ITI) appreciates the opportunity to provide testimony on China's indigenous innovation and industrial policies. ITI represents global leaders in innovation, from all corners of the information, communications, and technology (ICT) sector, including hardware, software, and services. China is a key market for ITI member companies, and hundreds of thousands of American jobs in high tech are directly tied to robust trade and business with China. Some of the largest beneficiaries of that trade are U.S. workers and businesses, many of them small businesses, who manufacture electrical machinery and equipment or develop software. Yet while U.S. exports to China are on the rise - last year, U.S. exports to China were nearly $92 billion dollars, up four-fold from a decade ago[1] - U.S. tech companies operating in the China market continue to face some of the most difficult market access barriers in the world.

We welcome China's efforts to create more innovative companies and to promote the development of innovative capabilities. Indeed, our companies have decades of experience building and creating innovative products throughout the world. However, China's approach to innovation -- "indigenous innovation" – is rife with challenges and shortcomings.

Today, I would like to highlight some of the most problematic examples of policies that make up China's indigenous innovation drive and undermine the ability of foreign companies to compete

[1] http://www.uschina.org/statistics/tradetable.html

fairly in the China market. Then I would like to offer a few recommendations on how the United States can address these challenges. Getting the China trade calculus right and building a stronger, healthier bilateral trade relationship is in the strategic interest of the United States.

The Challenge of China's Indigenous Innovation Policies

It is not China's drive to innovate that is such a challenge for us. We support that. Our primary challenges relate to China's approach to spurring domestic innovation through a thicket of policy expressions that veer dramatically from global norms and are often patently discriminatory. At its core, this is a problem of market access for us, though there are certainly broader strategic implications that come into play as well.

At a time when the global economy is still in recovery mode, governments should be doing their utmost to promote tried-and-tested practices that will engender economic success for businesses and the public alike. Unfortunately, time and again, the U.S. business community, and in particular the technology community, has run into problems with the Chinese government as it attempts to create and impose rules and regulations that are incompatible with global industry best practices and frustrate our ability to do business in that market. Indigenous innovation policies are the latest incarnation of this troubling reality.

China's indigenous innovation policies have been around for some time, but were introduced more formally in the 2006 *Medium- and Long-Term National Plan for Science and Technology*. The chief aim of this document was to foster the development, commercialization, and procurement of Chinese products and technologies. More precisely, it was developed to give a leg up to domestic producers by compelling government agencies to adopt rules and regulations favoring products that use Chinese-developed ideas and technologies. One concrete goal of the plan, for example, is for China to import only 30 percent of the technology it uses from overseas by 2020. The problem is, such polices more often than not do this at the expense of foreign players who have worked for decades in partnership with China to promote growth and prosperity and deliver innovative products to the people of China. This potentially puts at risk all

past and future investments that our companies have made in that market.

Getting Down to Specifics

While the policies may have understandable intentions, the means to achieve the ends and the consequences for companies from the United States and other countries do not bode well for our immediate commercial concerns or for the perpetuation of a troubling model that others might replicate.

One of the most notable of China's policies to advance indigenous innovation was its effort to establish a national catalog of products to receive significant preferences for government procurement. Among the many problematic criteria for eligibility were stipulations that products contain intellectual property developed and owned in China, and that associated trademarks be originally registered in China. This was an unprecedented use of domestic intellectual property (IP) as a condition of market access that no other country in the world requires, and one which made it nearly impossible for American companies to qualify. IP is developed all over the world, not just in one country. China has since backed away from this policy, and at the most recent U.S.-China Strategic and Economic Dialogue (S&ED) agreed to eliminate all indigenous innovation catalogs. We will need to be vigilant to ensure that this happens. But the indigenous innovation policy drive extends well beyond the catalogs.

China has been a persistent offender when it comes to IPR infringement. In its recently released report, *China: Effects of Intellectual Property Infringement and Indigenous Innovation Policies on the U.S. Economy,* the U.S. International Trade Commission (ITC) estimated that "U.S. IP-intensive firms' losses from IPR infringement in China were approximately $48 billion in 2009," and that "firms in this segment of the U.S. economy also spent approximately $4.8 billion in 2009 to address possible Chinese IPR infringement in 2009."[2] Across the U.S. economy, the effect is dramatic. The ITC further estimated that the United States would gain about 2.1 million jobs if China brought its IPR enforcement levels up to U.S. standards, and cited industry

[2] http://www.usitc.gov/press_room/news_release/2011/er0518jj2.htm

estimates that such improvement would bring close to 1 million jobs to knowledge-based industries.[3] The Chinese government has not invested the same resources to combat IPR theft – and if protecting innovative ideas is a key underpinning of an innovative society, China is doing itself and its domestic industry a disservice in this area.

The impact of China's propensity to develop and deploy its own country-specific standards that are not always based on their technical merits is of great concern to the ICT sector as well. Several years ago, for example, China endeavored to mandate a homegrown wireless standard called WAPI, despite the existence of a technology widely used around the world known as WiFi. Under the auspices of the U.S.-China Joint Commission on Commerce and Trade (JCCT), China ultimately agreed in 2004 to take steps toward a market-based, technology-neutral approach to the development of next generation wireless standards and to "suspend indefinitely its proposed implementation of WAPI as a mandatory wireless encryption standard." Despite this, China has pushed forward with WAPI anyway, and it is now a *de facto* mandated standard enforced by using the handset "type approval process" controlled by the Ministry of Industrialization and Information Technology (MIIT). To be sure, WiFi handsets are available in China now, but only if WAPI technology is built-in and enabled.

Emboldened, China may now be looking to do the same thing with PCs and servers by requiring that such equipment sold in the country include a technically unknown and untested "Trusted Cryptography Module" chip -- despite the existence of an internationally developed standard known as TPM, or Trusted Platform Module. Our understanding is that a few government ministries currently require TCM, but we are watching carefully the development and potentially wider deployment of this technology.

This trend sets a troubling precedent for future technology standards and represents a significant departure from global adoption of harmonized ICT standards. It also creates unnecessary technological complexity, compromises the basic principle of technology neutrality in policymaking, and undermines China's commitments under the JCCT and the WTO. Our

[3] http://www.usitc.gov/press_room/news_release/2011/er0518jj2.htm

industry is a strong proponent of standards that are voluntary, industry-led and global. Use of global standards based on industry consensus and technical merit is a long-established international norm that has served us well, promoting innovation, transparency, and system interoperability. With a global economy that becomes more integrated by the day, global solutions to standards setting undergird the way we develop and build our products.

Beyond standards development, China continues to increase burdensome testing and certification regulations on ICT products sold in both government procurement and commercial markets that are inconsistent with global norms. We often see overlapping, unnecessary or onerous testing requirements related to safety and other product testing. China has in place certification requirements to disclose sensitive technical information to government affiliated-labs for certain information security products sold to government buyers – something no other government does. The far-reaching Multi-Level Protection Scheme (MLPS), for example, would place completely unworkable testing requirements on many high-tech products going into critical infrastructure systems in China, and similar to the indigenous innovation catalog, MLPS contains domestic IP requirements as well.

In sum, whether through government procurement, standard setting, cyber-security, safety testing, or an unwillingness to enforce laws to protect intellectual property and prevent counterfeiting and piracy, the two common threads running through most of our challenges with China are policies that advantage domestic companies at the expense of foreign firms and that attempt to force the transfer of technologies. It is incredibly important to address these now, as such protectionist models could be replicated in other markets.

The Way Forward

There is little doubt that indigenous innovation polices are having an adverse effect on U.S. competitiveness. U.S. companies in China compete without the advantage of tax incentives and subsidies offered to Chinese companies under the policies. As the recent ITC report stated, the policies "appear to have eroded the competitive positions of U.S. and other foreign firms in

China while creating new barriers to foreign direct investment (FDI) and exports." In terms of the effect on the domestic economy, it is important to note that intellectual property and innovation have long played a prime role in driving the U.S. economy. The technology industry has been at the forefront of this drive for many years now, and therefore any attempt to hamper innovation abroad will have repercussions at home.

How do we address these myriad challenges? The U.S. Government should continue concerted efforts to address specific trade barriers, as well as strategically address the broader, underlying trends of protectionism and promotion of Chinese national champions. We commend past efforts by our government to address China's indigenous innovation policies, and we urge continued support of bilateral dialogues such as the S&ED, JCCT, and Innovation Dialogue. The Administration's role in rolling back numerous policies, including the indigenous innovation catalogs, has been instrumental. The United States should continue working closely with the private sector and with other governments to develop a clear, coordinated strategy for encouraging China to adopt global norms. When we have been most successful in dealing with China, it has been the result of close cooperation among governments and between our government and the private sector. And this needs to be an on-going, results-based effort.

Second, realizing the potential of a strong partnership will also depend on us taking steps here in the United States to improve our competitiveness. Looking east for solutions should not be our only priority. We must also do some work here at home to ensure our workforce and economy remains competitive with China and our other global trading partners. Lowering the corporate tax rate, adopting a territorial tax system, and promoting innovation incentives that promote research and development and intellectual property, among others will make the U.S. more competitive globally. And expanding the number of permanent green cards and temporary, high-skilled visas will both solve the current need for high-skilled workers and raise revenues. Additionally, robust investment in science, technology, engineering, and math (STEM) programs and education will create a talented workforce and keep America competitive for decades to come. These steps will take advantage of existing U.S. strengths, increase the ability of U.S. firms to create world-class innovative products, and make them more competitive globally.

Conclusion

To be sure, China presents myriad challenges today, and it will continue to do so for the foreseeable future. China's economic system relies heavily on the decisions of its bureaucrats rather than its markets, lacks the transparency and inclusiveness of capitalist economies, and has an unacceptable record when it comes to addressing IPR infringement, including piracy and counterfeiting and piracy. While it is clear that China's leadership is committed to improving IPR enforcement, we have yet to see major changes or increased sales. A thicket of vague rules, regulations and mandatory standards thwart U.S. trade and investment with China and call into question its position as an aspiring global leader. These policies hinder China's leadership evolution in the global economic community and limit the flow of cutting edge products to China's economy and its people.

We must, however, get China trade right. The Chinese economy is too big and too influential to have it any other way. Its market is too important to the United States and to the rest of the world. China is not a monolith. It is a diverse, complicated country that includes recidivist forces determined to go their own way through the implementation of problematic policies, such as indigenous innovation, which are discriminatory and protectionist.

But, there are also Chinese forces of change in government and industry that recognize if China is ever going to reap the full benefits of its economic might, it must transition toward fuller integration into the international economy, adopt global standards and regulatory practices, and fall in line with other widely accepted norms. Through sustained, firm, and sensible engagement, we need to identify these forces, work to empower them, and collaborate with them to effect positive change.

I am confident that we can successfully chart this course. Too much is at stake to do otherwise. Thank you.

VICE CHAIRMAN SLANE: Thank you, gentlemen.
We'll start with the questions.
Commissioner Shea.

PANEL II: Discussion, Questions, and Answers

COMMISSIONER SHEA: Thank you all for being here.

I have two questions. Let me see if I can get the first one in. We hear in Washington and elsewhere among policymakers that the United States will be the innovation and design society. Innovation enriches our lives. It makes our life easier, but I'm wondering whether we place too much pressure on innovation as a job creator?

You know, I looked at the UC Irvine paper on the iPod that showed that about 6,000 to 7,000 good-paying jobs were created by the iPod for the United States, which is wonderful, which is absolutely fantastic, but with a nine percent unemployment rate and millions of people who are underemployed, I wonder whether we expect too much from innovation. And, and frankly with respect to China, as China moves up the value chain and becomes more innovative, is there going to be an employment issue as well with China?

So that's the first question. Why don't I get your comments on that? Do you agree with this point or--

DR. ERNST: Absolutely. It would be nice if one could then go one step further. The Apple's iPod production model is really at best a short-term palliative. It doesn't solve our problems. We need domestic manufacturing, and we need to keep it alive. And why is that? Because without manufacturing, we can't do the other things; the design, the product development, the system integration all depend on proximity, I mean real physical proximity in many cases, with manufacturing. And so this is the one side.

The other side is that China is moving up. They're upgrading their capabilities. They are learning all these product development capabilities, and they are improving their processes and business models. We did a study on integrated circuit design in China, and China's role in the internationalization of integrated circuit design. Our research shows that Taiwan and India lead in terms of design capabilities, but China is almost on the same level. They can do all these things.

So we cannot assume that we will be able to retain a privileged position by just focusing on design. But more importantly, as you said, the employment effects of just concentrating on design are insufficient. In fact, we need in-depth studies on the *de facto* employment effects of the offshoring of manufacturing, as well as the employment effects of R&D offshoring. Researchers, like Dr. Segal and myself, we are all struggling to get hold of the relevant corporate employment data. We need this information.

COMMISSIONER SHEA: Dr. Segal, I read your book because

Commissioner Blumenthal recommended it so it was a good book.

DR. SEGAL: Thank you very much.

COMMISSIONER SHEA: You're welcome.

DR. SEGAL: I appreciate the plug. I agree with what Dr. Ernst said. I think it's clear that innovation is not going to solve all the problems, and R&D is mobile. Results of R&D are mobile. They can be easily--manufacturing plants can be set up in China with the big breakthrough that happens here.

In the book I talk extensively about innovation and the attempt to focus on job creation and how do you do that through firm creation, right, new start-ups, small companies being a major engine of job creation, but also the point that Dieter brought out about proximity. So proximity is important, both for incremental innovation, but also big breakthroughs. You need to have all these things collocated, and so the somewhat often used as a panacea is the focus on clusters.

How do you get all these companies--

COMMISSIONER SHEA: Right.

DR. SEGAL: --collocated? But I think that this is--as long as the expectations are not unrealistically high, and you don't think that everything is going to turn into the next Silicon Valley, you can, in fact, kind of ground at least the earliest stages of manufacturing and discovery locally through these types of policies.

COMMISSIONER SHEA: Dr. Neuffer.

MR. NEUFFER: I must say I'm kind of intrigued by the idea that things need to be collocated. I think we live in a global world. I think the way that the global supply chains are set up, it proves that that system works, and that we can have different functions, different supply chains in different parts of the world. So--

COMMISSIONER SHEA: I guess the point that Dr. Segal makes, Dr. Ernst makes, and I think Willy Shih in the previous panel, is that supply chains work, but innovation needs, having proximity to manufacturing is important for innovation. Do you agree with that, Doctor? I think that's the point that they were making. I don't know if that changes--

MR. NEUFFER: I don't necessarily agree with it.

COMMISSIONER SHEA: Okay.

MR. NEUFFER: Yeah. But the other piece of it, let's not too narrowly define innovation. Innovation, coming up with a new product is very important, but the diffusion of innovation is also critically important, and Rob Atkinson of ITIF, which is just down the hall from us, has done a lot of work on that, and that's where most of the productivity and social benefit comes in.

That's where most of the innovative activity comes from. When you use your BlackBerry, well, this is a wonderfully innovative product, but we

use it in myriad ways, innovative ways, that bring benefit to us, and so I think we shouldn't be so limited in how we think about innovation, and that affects what kind of policies we develop to further.

But I think innovation has to be a very critical component of all of our big economic policies, domestic and foreign. I think it is very, very critical to our success as a nation.

COMMISSIONER SHEA: Thank you.

VICE CHAIRMAN SLANE: Commissioner Mulloy.

HEARING CO-CHAIR MULLOY: Thank you, Mr. Chairman.

Dr. Segal, I also took Commissioner Blumenthal's advice and went out and got your book, Innovation.

COMMISSIONER BLUMENTHAL: I expect some reciprocity. Royalties--

[Laughter.]

DR. SEGAL: You guys aren't getting a share. I just want you to know that there's no royalties coming from this yet.

[Laughter.]

HEARING CO-CHAIR MULLOY: And I found that there are a lot of very interesting--I mean this is a good book, and I appreciate, Dan, you bringing it to our attention.

On page 39 of your book, you say this: "There is also an unspoken, but palpable, pressure from the Chinese government to move a company's advanced R&D unit to Beijing if the company wants to access the Chinese market."

You further say: "Eager to be a good friend of the Chinese government, foreign firms move R&D centers and higher level design to China."

That's not traditional trade theory, but that's what's going on.

Now, on page 193 of your book, you say this: "What does it mean if American companies remain leaders by moving more R&D abroad? Are we now witnessing a divergence between what is good for Cisco or Microsoft, Intel, GE, or any other large American technology company, and what is good for the United States?"

Then you talk about John Chambers of Cisco, saying, quote, "What we're trying to do is outline an entire strategy of becoming a Chinese company."

Then you say: "The interests of the American economy, however, remain geographically bound. We want to create good-paying jobs in the United States." The companies under pressure from the Chinese government for market access are saying you got to move R&D, and you got to help us move up the food chain, and our companies are doing so, but the jobs, we want good-paying jobs in the United States.

So is there a divergence between the interests of the American corporations, who I think are focused on shareholder value, and the larger

interests of the United States of America, and what can we do about this if there is such a divergence?

Now, Dr. Dieter Ernst, you refer to the same problem on page eight of your testimony. You ask is there a fundamental conflict now going on between the interests of the country and the interests of these global corporations?

So I'd like to just throw that out. Dr. Segal, Dr. Ernst, and then Dr. Neuffer, if you have anything you want to add to that question.

DR. SEGAL: I think there is a growing possibility that, yes, that the interests of global companies with their national economies' are diverging. I think it's in part because of the Chinese government's pressure, but I also think that's where the markets are. Because they want to be closer to the final consumer, they want to be closer to these growing markets. That's where most of the growth is going to be.

As they want to be close to those markets, they move R&D and manufacturing and other parts of that to the localities. I think this gets to the original question asked by Commissioner Shea, which is that companies can do extremely well and hire very few Americans within the U.S. economy. So the question is how do you address those concerns?

The way that I think we should do that is we don't want to stop these companies from going to these markets. We want them to remain competitive. The U.S. economy is, in fact, dependent on them remaining in these markets and being global leaders.

But we want to ensure that more and more jobs are created locally. And so that is why I focused more actually on small start-ups and small job creation. I think the big firms are going to be fine, quite honestly. I think they're going to continue to prosper in these markets, and they're going to continue to be able to do well.

The question is how do you make sure that new firms start, and they start here, and then they hire locally, and then they grow locally? And that I think gets you around this problem.

DR. ERNST: The first point I would like to make is that I actually agree to some degree with Mr. Neuffer. The overriding, the most powerful, process is this global transformation: R&D and innovation is internationalized. That's happening.

So the question really is: What can policymakers do to optimize the benefits for different locations where these policymakers are allocated. So in the U.S., the question is: What can policymakers do to sustain and enhance employment generation in the U.S.?

And I think things can be done. By the way, Ralph Gomory, who I think is in the next panel, deserves the copyright for stating this fundamental difference of interest between country and corporations. And if you make this distinction, you're not blaming companies; you're simply stating a fact.

Companies are driven by return on investment. They need to do all these things.

So once we understand what exactly are the constraints of corporate strategies, then we can do a number of things, and I think we are basically talking like twin brothers here, I mean with Dr. Segal. We need to come up with institutional innovations.

We can build on existing institutional innovations like SBIR, the Small Business Innovation Research Initiative. We need to strengthen that. We need to strengthen the role of NIST in fostering particularly innovation in small and medium-sized enterprises. That's something that can be done, that's the American way. The Chinese will have a hard time to copy that. But we can do that.

So there are ample opportunities. I am describing illustrative examples in my written statement. Other possible responses are systematically examined in a new EWC Study on Indigenous Innovation and Globalization which just came out. This study is specifically focused on China's standardization strategy and resultant challenges for the U.S. [See Additional Material Submitted for the Record, page 155.] Again, we in the U.S. do have a toolbox of corporate strategies and policies to address these issues. We have an institutional environment where we can do things more flexibly. We can tap into our international networks so--

HEARING CO-CHAIR MULLOY: My time is up so I--

DR. ERNST: Sorry.

HEARING CO-CHAIR MULLOY: --I will yield back to the Chairman. We have another chance to come back on the second round.

Thank you. Thank you, Mr. Chairman.

VICE CHAIRMAN SLANE: Dr. Ernst, I've been fascinated by the German economy. Their wages are higher than ours. Their unemployment is under control, and it seems to me that their corporations have an allegiance to the German government and not solely to their stockholders, and for the most part, their advanced manufacturing does not leave Germany.

Can you talk a little bit about that model and whether we should be looking at that to solve some of our problems here?

DR. ERNST: Great question. And by the way, Germany may be a good example, but so is Denmark, so are the Netherlands. As you know, small European countries have very different approaches to address this issue. So it would really help if in the U.S., there would be a debate that looks at some of these different ways of approaching the issue in open economies, in market-led economies.

In Germany, the government does have a role to play. And there is a long history of government involvement. In Germany, you talk about developments since the 19th century, the Prussian state, Bismarck, with top-down policies of industrial development. And fortunately enough, thanks to

the U.S. liberating Germany after the Second World War, Germany was able to absorb elements of the American system. And so the Germans have been trying to mix these different elements, but we still keep the essential point that you mentioned: companies have a responsibility to the society at large.

The German term is "Eigentum verpflichtet"--ownership is an obligation. And so, while return on investment is the basis, companies also need to contribute something to society. But it may be difficult probably to replicate the German system in a different context.

On the other hand, for me, what I see in the U.S. is that you have this deeply entrenched tradition of community service. So companies, wherever they are located, are expected to do something for their community. Maybe one can try to reinvigorate that American tradition. So the short answer is: By looking at these examples, we need to translate the strengths of the German system into institutional and policy approaches that are in line with American values. But learning from best practice in Europe and elsewhere is the right way to go.

VICE CHAIRMAN SLANE: Thank you.

Commissioner Wessel.

COMMISSIONER WESSEL: Thank you, gentlemen, and, Mr. Chairman, or Mr. Vice Chairman, I should say, I certainly think that we should try and emulate some of the systems you described.

One of the strengths of the German system, as you know, is codetermination and the strong participation of labor in the works councils at those companies that has helped advance not only skills but an economic nationalism that has spurred a lot of growth.

I'd like to go back, Dr. Ernst, to some of your comments and challenge you a bit, if I could. You said we need to understand the subtleties of the Chinese system. Quite frankly, I don't see the subtleties. I read their 12th Five-Year Plan and, as I'm sure you saw the chart that Dr. Shih put out with the industries they hope to excel in, I believe the Chinese.

I agree with Dr. Shih that the last 20 or so years, the Chinese have been extremely successful in reaching the stated and written goals that they outline. So I don't see the subtleties. They want to dominate these industries. If you look at the clean and green energy sector, they say they want to dominate that worldwide, and they take actions to do so.

They identify that innovation is key to long-term growth, economic prosperity, and the success of the nation. And so they engage in policies to spur indigenous innovation. When we identify certain problems, they decide what the tipping point is in terms of when the cost of engaging in those policies exceeds the benefit, and then they simply do it through other ways. They may eliminate something from the written record, but they practice it anyway.

And Dr. Segal, you say American leverage is limited. I don't also see

the subtlety there, and the fact that, as I recall, more than 20 percent of China's exports come to the U.S., and, as I recall, five or six percent of our exports go to them. So our market is more important to them than their market is to us.

So I'm frustrated. The American people are frustrated. We read their policies. I believe their intent. What should we do about it? Is it just the S&ED? Is it JCCT? Or do we need to take more dynamic action to get China to act like a true market participant following market forces? Each of the participants, please.

DR. ERNST: I am referring to subtleties in the internal debates in China on how to implement these grand visions. I talk to corporate executives, I talk to people in government, and particularly in research institutes related to government agencies who are tasked to make things happen. And so what you hear is, okay, the big bosses up there are telling us what they want.

But as the experts, we know a bit more about the real world in which we are supposed to implement these grand visions. And the real world is one of internationalized R&D and of internationalized production. As a result, China is deeply integrated in the international economy in terms of trade, in terms of the foreign direct investment, and China doesn't want to lose that.

COMMISSIONER WESSEL: But do you doubt their desire to achieve the objectives?

DR. ERNST: The objectives are they want to catch up, meaning they want to be within 20, 30 years on the same level as the U.S., the European Union, and Japan. There is no doubt that the Chinese mean what they say. And of course one shouldn't be surprised about that intention.

China is a big country. It has a long history. They feel they have a right to achieve these objectives. The question is in which way? And on this question, there are different factions in China with conflicting interests. This often gives rise to ambiguity in policy implantation. This is what I mean by subtleties. There are very powerful factions at the highest levels of the party and in the security and military establishments who really want to achieve the objective of indigenous innovation through an autarchic policy. These factions are very powerful. You could argue that before the next Party Congress and all these big decisions about the new leadership that the move towards greater nationalism is actually getting worse.

But the people with whom American companies, European companies are dealing with, who are designing and implementing policies, have slightly different opinions, and these people matter because they have the expertise.

That's what I'm trying to say, and so our trade diplomacy should be a bit more proactive and smart. We should seek to strengthen coalitions of

interest, limited as they may be, with Chinese stakeholders who favor greater openness. And a few things can be done through these contacts. At the same time, of course, we need to apply pressure. There is no doubt about that.

COMMISSIONER WESSEL: Thank you.

VICE CHAIRMAN SLANE: Commissioner Blumenthal.

COMMISSIONER BLUMENTHAL: Thank you.

First a statement and then a question. I think we do have a very cozy relationship between business and government. It's just the cozy relationship happens to be with Goldman Sachs and the banking sector. So that's our industrial policy.

I think it's ironic to talk these days about a government policy and government getting involved in industry when we have these massive bailouts of the financial and banking sector. So we do have a government policy. It's not quite working out for us the way we want it to.

I understand, you know, we're all grappling with this issue of job creation versus innovation and job creation, number one, I think. But it seems to me, number one, that everything I've read is job creation is being stalled by companies in the United States that are sitting on trillions of dollars of cash and not investing it because of policy uncertainty. I mean that's everything I've read.

Two, our manufacturing sector is booming in terms of output, but it's not creating jobs because of productivity. And that's my observation.

So going back to job creation, how do you spur job creation, and what's China's role in it, it seems to me, as Adam Segal pointed out, this culture of innovation, small business, and entrepreneurship seems to be the answer.

I sort of turn this question around to an article that I'm reading and a study done by a couple of consulting companies. Actually Chinese entrepreneurs are leaving China in large numbers because of their policy uncertainty, and the days when the highest net worth individuals started to leave China was actually in 2008 as soon as Wen Jiabao announced his plan, and the numbers I think in terms of wealth leaving China illicitly are staggering, and entrepreneurs leaving China, staggering.

So I wonder--because in my view the job creation is going to be, as Adam Segal pointed out, based on small business and entrepreneurship, and everything else you read about China's ability and ease of doing business is just paltry, just appallingly bad. So I wonder, again, if that remains the case, and if these numbers are true about entrepreneurs leaving China, if they're going to get to where they think they're going to get? That's the question.

DR. SEGAL: I think one of the great success stories in the Chinese growth model has been this releasing of entrepreneurial abilities. I think in

the realm of innovation, a very narrowly based innovation, science-based innovation, it's fairly limited. The incentives are not to put something off into seven years from now when you can make a lot of money doing a Facebook clone or a LinkedIn clone or whatever else it is for the Chinese market.

I have seen discussions about this idea that wealthy Chinese are leaving, and I haven't seen the report so I can't really comment on it.

But I think on the larger frame, on the policy side, if you look at the 12th Five-Year Plan, officially, you have two minds--right--all this discussion about shift to consumption, domestic consumption, and a model that would seem to be more driven by smaller companies in the private sector, but all of this discussion also about strategic industries and all of these other things, and that is clearly the dominant push.

The Chinese seem to think that they can have it both ways, that they can continue to push state-owned enterprise and strategic industries and that the private sector will somehow continue to grow, but the statistics actually show the opposite, that it is shrinking, and the state enterprise sector is becoming larger.

So I think that is a large concern for them. I think when you're talking about building this innovation system, the companies that have been most innovative so far have come from this semi-private sector, and they're squeezing them.

MR. NEUFFER: Listen, going back to Commissioner Wessel's question, the Chinese want to succeed. Ultimately, they want to succeed. They want to have a very successful economy. They want to catch up with us. And to do that over the long run, they probably can't have their own, separate economy. They probably have to adopt global approaches to standards and testing and certification in the way they run their economy.

So China is a big player. We can't really tell China what to do. China can't tell us what to do. We have to provide incentives. We have to provide narratives that help China understand that their long-term trajectories right now are probably not good for China, and I can tell you that since I've been working at this job at ITI for the last four years, our successes have largely been the result of us sitting down and having long repeated discussions with our counterparts in China explaining why their policies are often not good for them.

COMMISSIONER BLUMENTHAL: I would say that I would get really more scared about a competitive threat from China if they actually had an entrepreneurial culture. What they're doing now scares me less actually, but anyway. I'll stop with that.

VICE CHAIRMAN SLANE: Commissioner Cleveland.

COMMISSIONER CLEVELAND: I want to pick up on what Commissioner Slane mentioned and also what Commissioner Blumenthal mentioned.

In talking about Germany, I was just looking through the Doing Business report of the IFC, which is an annual report on how easy it is to operate, to start up a new small or medium business, and it reflects the regulatory and legal impediments. Germany ranks 88th in starting a business and 67th in registering property; the Netherlands is 71st in starting a business and 46th in terms of regulatory; the U.S. is 12th and 9th.

And so I'm not sure whether they are indeed good role models for small business start-up, but that's the IFC's opinion.

Mr. Segal, in your interview with Strategy and Business, I really liked your breaking down innovation into hardware engineering and technology versus software, and you talk about the massive numbers of engineers coming out of universities that don't have the soft skills, and that there is an emphasis on rote memorization exams, but most importantly that the government direction of start-ups emphasizes reverse engineering, and there continues to be a great deal of deference to political authority, which doesn't support this soft individual initiative.

Do you think that the government will figure out that that's the actual impediment to innovation, and what do you see as the long-term trends when it comes to this software side, as you describe it?

DR. SEGAL: Clearly, on the education side, they've already identified that as a problem. The Chinese policymakers in the educational field are already talking about how do we make the system more encouraging of individual initiative? How do you encourage group collaboration, all these things that we talk about in the U.S. as being our strengths compared to the Chinese system?

How they're going to build that system is another story. Implementation--and I agree with Commissioner Wessel that the Chinese have never been shy about their goals. Implementation has always been an issue, how they're going to get there is an issue.

On the politics side, it's hard to say. You occasionally will see an interview with a retired university professor or, in fact, others who are kind of out of the political limelight, who will then say, well, yes, we're never really going to create creative people unless we have greater openness.

I suspect, as Dr. Ernst said, there are people in the government who realize this and recognize this, but given the current state of the debate about political reform more broadly in China and the retrenchment that's going on across almost all sectors of political and cultural life, I don't see how they're going to make any progress on that, certainly before the succession, and probably if not two or three years after the succession.

COMMISSIONER CLEVELAND: So if they don't make progress in this area, does that, to some extent, mitigate the risk?

DR. SEGAL: Again, it depends on what we're talking about. If we're talking about creating the next big new idea, the next big breakthrough, yes

I think that that is going to be pushed off, but if we're talking about, as Dr. Ernst said, Chinese companies moving up the product chain slowly and gradually more jobs being located in China, no, I think all of those things continue a long time given the current system.

COMMISSIONER CLEVELAND: Thank you.

DR. ERNST: Can I?

COMMISSIONER CLEVELAND: Yes, please.

DR. ERNST: Can I add something to that? So I mean time is of the essence, and it takes time to make these changes. I can give you a concrete example--Tsinghua University. They have courses and internships of their students in companies where they try to install this kind of entrepreneurship and openness to international business practices.

They bring in speakers and teachers from overseas. You may say, okay, that's just one little example, but it shows they are trying to address that.

COMMISSIONER CLEVELAND: Yes.

DR. ERNST: The person who is in charge at Tsinghua doing that, who is dean of one of the leading schools is also the person who is supposed to give advice to the Chinese government on how to develop its dialogue on innovation policy with the U.S. as part of the Economic and Strategic Dialogue.

All of that comes with the caveat that for the next two years, this will probably be somewhat lower key. What matters however is that capabilities are developed for greater openness and pragmatism. This to me indicates that we can expect to see more of that within the next five years.

As for your reference to the regulations in Germany, this is precisely one of the reasons why I enjoy living and working in the U.S.

COMMISSIONER CLEVELAND: Yes.

DR. ERNST: Okay. And so we are talking about a system that has strengths and weaknesses. I think Co-Chair Slane was referring to the strengths, that is, the "Mittelstand," the small and medium-sized enterprises, which have survived amazingly, many, many challenges, and they're doing really leading-edge stuff in precision mechanical engineering. They're still strong.

What has enabled them to do that may be that in Germany there is space for a dialogue between Siemens and Volkswagen and the government in order to keep some of these suppliers alive.

COMMISSIONER CLEVELAND: I agree that Commissioner Slane was speaking to the strengths. I think it's just important to maintain balance, and a huge part of why it works in a number of these countries is subsidies. So I think that's an issue that just needs to be identified.

Do you think that Secretary Clinton's 100,000 student policy is going to change this discussion about software? This is the initiative that she's

announced to make sure that 100,000 American students go over and study in China.

DR. SEGAL: I doubt that those students will be integrated enough to play a role. I think what's changing the software discussion are the returnees. So the people who are going back who spent 20 years at Yale or 15 years at Intel, they are bringing all those soft skills with them, in these R&D centers themselves, right? So they are training people on how you build collaborative programs, how you develop cooperative projects with local universities. So those, I think, are the two main hoses for kind of diffusing those skills.

VICE CHAIRMAN SLANE: Thank you.

Commissioner D'Amato.

COMMISSIONER D'AMATO: Thank you very much, Mr. Chairman, and I'd like to thank the panel for the very illuminating written testimony and this discussion today.

I would also like to particularly thank Dr. Ernst for the very valuable briefing he gave the Commission when we visited the East-West Center recently in Hawaii.

I think underlying much of the discussion on this panel is the adequacy of the information that we're evaluating. From the beginning of the work of this Commission, the question of the adequacy of information on transfers of manufacturing capacity, employment effects, the amount of R&D, the type of R&D that's regularly being transferred to China has been a question.

I notice in your testimony, Dr. Ernst, today, you recommend that the private industry needs to be more forthcoming in providing the U.S. government with information and evidence, especially unemployment effects, both home and overseas, of its manufacturing and R&D activities in China, as well as other items, cybersecurity, IP theft, and other damages and costs of the transfers of Chinese policies.

It might be a little bit much to expect companies to voluntarily provide this wealth of information, particularly publicly, in a competitive environment, but I would like to mention a few years ago this Commission made a recommendation, and I want to get the panel's reaction to it, as to its value.

The recommendation read that the Commission recommends the creation of a federally-mandated corporate reporting system that would gather appropriate data to provide a more comprehensive understanding of the U.S. trade and investment relationship with China, which would include: reports of U.S. companies doing business in China on their initial investment; transfers of technology; offsets or R&D cooperation associated with the investments; and the impact on job relocation, employment, production and capacity from the U.S. or U.S. firms overseas resulting from any investment in China.

That's a pretty big mouthful, but I'd like to have the reaction of the participants here as to would there be a value in pursuing that and continuing to pursue that recommendation?

MR. NEUFFER: First shot at that.

COMMISSIONER D'AMATO: Yeah.

MR. NEUFFER: Probably wouldn't be very welcomed by the private sector.

COMMISSIONER D'AMATO: Probably not.

MR. NEUFFER: These kind of additional regulatory burdens are unhelpful in an extremely competitive environment, other competitors wouldn't have these burdens placed on them, so it wouldn't be helpful for that reason.

And also I'm just wondering what the purpose of that kind of information would be, how that would help inform us going forward? I mean I would hope the focus is really more on ensuring that our global partners, global counterparts, are operating on a level playing field, getting them vectored towards global approaches.

At the same time, creating a better environment at home focused on tax policy, trade policy, and a talent policy. So my simple answer--would be kind of a cool breeze to take that kind of approach.

COMMISSIONER D'AMATO: Cool breeze.

Dr. Ernst, does this fit the kind of information that you were recommending in your testimony?

DR. ERNST: Can I just say one thing before? I used to work for the OECD in Paris, and we had the task of developing Indicators for Science, Technology and Innovation. And within the relevant committee, we had the national delegations looking at our ideas and they were saying: "We cannot share information on this very sensitive topic."

And over the years, things have moved a little bit further, not completely, not as much as we would have liked at that time, but we did move forward. It can be done, as this kind of information can be anonymized. There is no need to identify companies.

The OECD probably provides the right environment to make sure that the U.S., Japan, Germany follow the same obligations of providing this information. It could be done.

The next step then is why should the collection of such data actually be in the interests of the companies? When I interview companies, they would even say many times: "We don't actually know what's happening within our company. We'd like to have somewhat structured formats of collecting this information, within our company as well as across our industry. This would help us to get a rough idea of what's happening in our sector.

So the data availability is really important. For instance SIA, the

Semiconductor Industry Association, a few years ago started to do a small exercise, and it had really interesting information on the number of engineers working in Asia. This data collection was stopped. I don't know why, but it didn't continue. Of course I understand the concerns of individual companies.

I also understand the concern that when we in the U.S. are collecting employment data, our competitors in other countries may seek to avoid doing the same. But this should be something that can be handled.

COMMISSIONER D'AMATO: In the aggregate, would it be a value to have this information a little bit more systematically compiled?

DR. ERNST: Sorry?

COMMISSIONER D'AMATO: In the aggregate, would it be useful to have this kind of information compiled to understand better what the transfers are?

DR. ERNST: Absolutely. Yeah. And then, maybe in specific areas where we are really concerned, let's get at least some quantitative indicators. But right now we have nothing.

MR. NEUFFER: Well, that's not really true, but let's keep it--

DR. ERNST: Almost nothing.

MR. NEUFFER: Let's keep it voluntary, and also the ITC did a great study on China, interviewed 5,000 companies that answered very sensitive questions. That kind of targeted approach can be very useful.

DR. ERNST: And the people who did the ITC study actually are saying: "Finally we're able to examine the employment impact of offshoring of manufacturing and R&D. We need more of that information, and we need some support from, for instance, your Commission by making statements. We need more of that." The ITC people would be happy if employment data collection would be improved.

COMMISSIONER D'AMATO: Yeah.

Mr. Segal, in your work on innovation, does this seem to be something that would be useful to pursue?

DR. SEGAL: I think I'll split the difference. I think that clearly, I'm not sure I would embrace a required reporting, but I think having the data out there would be extremely useful.

But I think the larger issue, of course, is of definitions. Do we have the right metrics any longer? What are we concerned about? What type of innovation? All these other things.

I do think it would be also useful to get back to the larger, to the question that Commissioner Wessel asked me about leverage, in that I think part of the issue with us pursuing WTO cases with China or putting more pressure on China has been the lack of that information, and then companies don't want to be the lead complaint because they are afraid that they are going to have to pay in the future in the Chinese market.

So to the extent that you have aggregate data that is anonymized, that helps you then pursue those goals.

COMMISSIONER D'AMATO: Thank you.

VICE CHAIRMAN SLANE: We're going to go to a second round of questions. We have a little bit of time left.

Commissioner Shea.

COMMISSIONER SHEA: I have two questions, one for Dr. Neuffer and the second one for Dr. Segal.

Dr. Neuffer, could you give us a status report on the business software legalization commitments made by President Hu in January and I think followed up in the SED in May? Are concrete steps being taken to fulfill those commitments? And I'd be curious about your views on that.

And then, Dr. Segal, Andy Grove wrote an article for Business Week that got a lot of attention, and he basically said, quoting here, "U.S. lost its lead in batteries 30 years ago when it stopped making consumer electronics devices." And he emphasizes that as happened with batteries, abandoning today's commodity manufacturing can lock you out of tomorrow's emerging industry.

And then he talks about our inability to scale up. We innovate, but we don't scale up and create jobs from the innovations. So I would love to hear your thoughts on Grove's points there.

Dr. Neuffer.

MR. NEUFFER: First of all, just to set the record straight, my great-grandfather would be very happy with how my name is being pronounced here.

[Laughter.]

MR. NEUFFER: Somewhere on the boat over, it became Neuffer. Thank you.

HEARING CO-CHAIR MULLOY: Neuffer?

MR. NEUFFER: Neuffer, yeah.

COMMISSIONER SHEA: I'm sorry.

MR. NEUFFER: That's okay.

So on the IP question, I must defer a bit on that. That's not something that the Information Technology Industry Council, we particularly place a huge focus on. It's a big deal for our companies. There are some other associations that do that.

I think that there has been a special IP campaign that's been going on in China, and things have improved as a result of it. But whether that's sustained in the long term is a question and the long-term prospects for continued IP infringement, I think, are not great.

As far as software legalization, that's a big issue for a number of our companies. If you'd like, I can submit a written response when I have a little bit of time.

COMMISSIONER SHEA: Yeah, that would be helpful.

MR. NEUFFER: Thank you.

COMMISSIONER SHEA: Thank you, Dr. Neuffer.

Dr. Segal.

DR. SEGAL: If I remember the Grove article correctly, I agreed with the diagnosis but not the solutions. I think discussion about manufacturing and scaling up echoes what we were talking about earlier.

I think the solutions ignored the point that Dr. Ernst made before, and what I agree with, which is that these are already globalized processes, that even for the smallest companies, at the very beginning, they may involve some design that occurs in Bangalore and some that occurs in Portland, and you have to figure out how you're going to move back and forth and scale those things.

So the solutions, I think, are less trying to prevent these things or insulating the U.S. from those and more making sure that local and state officials have the capabilities and the institutions to make sure that they can plug into it and scale up.

COMMISSIONER SHEA: Okay. Thank you.

VICE CHAIRMAN SLANE: Commissioner Mulloy.

HEARING CO-CHAIR MULLOY: Thank you, Mr. Chairman.

Just following up on the line of questioning that Commissioner D'Amato had, we made a recommendation on data collection in our 2002 report. And I know there was some discussion about that.

Would you witnesses be willing to look at the recommendation, and we'll provide it to you, and then offer us comments on whether you think that's the way to go or should it be refined in some way if we want to go back to that kind of recommendation?

That would be very helpful to us. Would you be willing to do that?

[Panelists nod in the affirmative.]

HEARING CO-CHAIR MULLOY: Thank you. Now coming back to your book, Dr. Segal, on page 39, you say this: "Under the terms of China's acceptance into the World Trade Organization, the government agreed to stop requiring technology transfer to Chinese companies in return for allowing foreign firms access to the domestic market."

They agreed. We raised it. We said we don't want this forced technology transfer for market access.

Now, here's what you say: "Demands may no longer be made openly, but multinational corporations know that officials are more likely to reward those who actively contribute to Chinese technology development."

So, in other words, they're saying to the American company, you want to be a friend of China, you better transfer that stuff, and then we'll get better treatment in a Chinese market.

Now, Dr. Ernst, in your paper, which you wrote for the East-West

Center, in May 2011, entitled "China's Innovation Policy Is a Wake-Up Call for America," you say on page nine of that: "As the U.S. has very little leverage over the Chinese government policy, it makes more sense for the U.S. to think about what its own response should be rather than to expend lots of energy trying to change Chinese policy."

We attempted to change Chinese policy on this forced technology transfer. We got them to agree to it in the WTO. They continue to do it, and they do it in a different manner. They say, well, we're not really forcing it, but the companies know they'll be a friend of China if they do it and not a friend of China if they don't.

So to me, the response would be stop telling them what we want them to do; let's start doing things to defend our own interests. And I'm wondering what should we do on this issue, taking your advice, Dr. Ernst? And then if other people want to comment on it, that would be very helpful.

Do you see what I'm talking about, Dr. Neuffer? Dr. Ernst?

DR. ERNST: In my written statement, I tried to clarify what I would really like to say on this point. I think we need to pursue two approaches simultaneously. So we need to bring our house in order, of course, and as I indicated before, there are many things that can be done, and some of these specific issues have been raised presumably also in other panels.

On the question of can we shape or influence Chinese policies, I would now say more explicitly we can actually influence it.

HEARING CO-CHAIR MULLOY: Oh, you do.

DR. ERNST: Very much. And why? Because, look, I mean USTR and Commerce Department, but especially USTR, is most of the time forced to respond to corporate issues raised by U.S. companies.

What we need is a more strategic approach based by very careful intelligence gathering about who are the actors on the Chinese side. We need more information on that. We've got these different stakeholders, the different interests, we know the headlines, but we don't know the details, and, of course, Mr. Neuffer--Neuffer--

MR. NEUFFER: Okay. Good enough.

DR. ERNST: Okay--is absolutely right. I mean through U.S. ITO, there have been many discussions and probably you have different forums for doing that, and this helps because in many of these debates, I'm a researcher, but I'm also talking to Chinese corporate persons and government persons.

They would say: "Tell us what we should do. Actually how can we get out of this mess? Yeah, we have objectives, and they are set from the top. This is how policy is formulated here. And actually it probably makes sense for us in China. But how can we actually improve our policy so that we don't scare away, we don't create unnecessary conflicts?"

Now some of that may be tactical posturing, and I'm not naive. I

understand that, but what I really think, and what I very much agree with is that in China there's genuine interest in learning more how to better do these things. So it requires dialogue, dialogue, continuous dialogue.

HEARING CO-CHAIR MULLOY: Dr. Segal and Mr. Neuffer.

MR. NEUFFER: I just can't agree more that there needs to be more dialogue. There needs to be more focus on explaining to our Chinese counterparts why we do things in a certain way and why it's beneficial and why what they're doing is probably not good for their own interests.

But going back to the question of leverage, I think we have quite a lot of leverage when it comes to the Chinese. I think we've seen that in a number of case studies in recent history, most recently with this indigenous innovation catalogue scheme.

A huge amount of international pressure. Japan, the Europeans, letters signed in the highest places, from associations around the world to the highest levels in China. It really embarrassed them. China was an outlier, and they stepped back.

So I think that, you know, concerted international focus on bad policy is very, very important, combined with smart abiding exchanges to help the Chinese understand what good policy looks like.

DR. SEGAL: I mean I'm theologically aligned with both those answers. I think that, as Mr. Neuffer mentioned, when multilateral pressure occurs, when there is very little space between the private sector and the U.S. government, the Chinese tend to back down, especially if it's multilateral. I think if you bring in Japan and the EU on these standards issues and procurement catalogs, I think that that has been the case.

And I also largely agree with Dr. Ernst about that there are those in the Chinese bureaucracy who want innovation, but they want it in a more open and global way, and the work that he's done and others have done about standards show that the standards that have been dominated by the Security Ministries, like WAPI, there's much less room for discussion.

When you look at digital entertainment where you already have Chinese global firms involved, there's much more room for creating a more transparent open process.

All of that said, I do fear that these have been the weaker parties in these debates, and that we just don't know how it's going to turn out long term. I think the long-term goal, the long-term frame, is still to increase Chinese capabilities and make sure that China is not dependent on any other country for any other critical or core technology.

That has traditionally been interpreted into more mercantilist closed policies, and I fear that those who have a more expansive open view are not in the position to win that battle.

HEARING CO-CHAIR MULLOY: Thank you both. Thank you all.

VICE CHAIRMAN SLANE: Commissioner Wortzel. I'm sorry. Wessel.

COMMISSIONER WESSEL: Wortzel, Wessel. It's--

VICE CHAIRMAN SLANE: Yeah, it's all the same.

[Laughter.]

COMMISSIONER WESSEL: I know how you feel now.

[Laughter.]

COMMISSIONER WESSEL: Thank you, gentlemen.

I'd like to go back to something you said, Mr. Neuffer, connected, Dr. Ernst, to something you've talked about because we face fundamental challenges here.

Dr. Ernst, you're talking about DARPA, SBIR, NIST, all of which I am a great supporter of. We're facing major budget challenges, and I fear that rather than investing or expanding their charge, we're going to be cutting back.

Mr. Neuffer, you're talking about dialogue, and no one is arguing that we shouldn't have dialogue, but having worked in Washington for more than three decades, we've had a substantial change in U.S. policymaking here since 2000, 2001. The first question that comes up whenever a policy is brought up is, is it WTO legal?

That's a major change in the way Washington has done work. I don't think China asks that question when they're considering what they're going to do in their five-year plan.

You represent a number of very important U.S. players. Again, we need to continue the dialogue. But at what point do we say that our laws need to be brought into line, utilized, to go after things? Our first MOU on IPR, if I remember, was 1994. We signed four other MOUs, each of which, of course, we meant, or the Chinese said they meant, and we still face piracy in the 90 plus range.

I don't see the dialogues yielding tremendous benefits. More U.S. companies are offshoring and outsourcing. They're still succeeding because of the quality of their innovation and their people, but the balance is changing.

So what would you advocate with your former hat as a USTR official, as an association official, not acting on behalf of an individual company? I understand they're concerned. What do we do? Are we right to be frustrated and say time is growing short and we need real action?

MR. NEUFFER: I must say as a former USTR official, we didn't use the word "dialogue" much. It wasn't a very happy word in the building. But I can, so let me just say, dialogue is a piece, a variable in the calculus. It needs to be there.

But WTO action is critically important. We're taking more cases against China than we've ever done, and I don't know if you've noticed, but the Chinese are kind of getting it now that, oh, this is how we do it. Instead of, instead of slapping back with some crazy retaliatory measure when we

take a case, they just go with the case and they go through the procedures as everyone else does.

So the Chinese government now gets that, and that's a big step, and we're taking more and more cases. So you need WTO action, and the other piece of it, and I have alluded to before, well, there's two pieces. The other one is the multilateral work--and we're doing that in the tech sector--which is building strong communities of like-minded folks in the private sector and government to coordinate and work the China issue.

And then the bilateral work, and as I mentioned, you've got to come in and attack the industrial policies at the high level, or you got to bring in Treasury and the White House, the S&ED, and you don't let the Chinese forget that we've got some high level problems, and then you go in the trenches with the JCCT and deal with each individual problem.

And this is going to be a long, sustained effort. I think we'll get wins along the way, but it's not one day we're going to wake up and say we've done it. That's just not how it's going to play out.

COMMISSIONER WESSEL: Thank you.

VICE CHAIRMAN SLANE: Thank you.

And our final question is with Commissioner Cleveland.

COMMISSIONER CLEVELAND: Gentlemen, could you talk a little bit about how changes in U.S. visa or immigration policy might be useful in this discussion? I think, Mr. Segal, in this interview that I was reading, you talked about the fact that the U.S. needs to stay tapped into emerging new centers of technology and innovation, and there needs to be a flow back and forth of ideas, and, in that context, visa policy needs to be right.

I wonder what you might mean on that front, and if you other gentlemen have any comments and immigration policy, that would be helpful.

DR. SEGAL: Generally, I refer specifically to the start-up visa, getting that right, as well as clearing the line for those who are waiting, you know, have green cards and are waiting for citizenship--I think the number is a million or so--how to smooth that process.

MR. NEUFFER: And just very quickly, immigration reform is a big issue for the tech sector. We basically want all the foreign students that we've spent a lot of money on and a lot of time on and a lot of resources training here to stay here and work in the U.S.

And I don't know if you noticed the Washington Post article over the weekend talked about the immigration, the skill and education level of immigrants in the U.S. The mix has moved dramatically towards more higher-educated immigrants in the U.S.

DR. ERNST: As long as the U.S. remains open, it has the great advantage that those people who go back to China or India, and particularly to China, these returnees, they bring back knowledge about how to do these

things.

So, for instance, I'm thinking about a concrete person who studied at Washington University, you know, trade law, and he's now in the Ministry of Commerce in China focusing on WTO. And he's actually one of those persons who would say, well, we can use WTO also for our interests, but we need to learn how we need to play.

This learning on the Chinese side may not always be an advantage, an immediate advantage, for us. But at least we can shift the battlefield to something that we know how to play well. So if we have people who have this knowledge going back to China, it's in our interests.

COMMISSIONER CLEVELAND: Thank you.

VICE CHAIRMAN SLANE: Thank you very much, gentlemen.

It was enormously helpful, and we really appreciate your time. We're going to reconvene at 1:45.

[Whereupon, at 12:46 p.m., the hearing recessed, to reconvene at 1:50 p.m., this same day.]

A F T E R N O O N S E S S I O N

PANEL III: TECHNOLOGY DEVELOPMENT AND TRANSFERS TO CHINA

HEARING CO-CHAIR MULLOY: We are about to have the third panel of the hearing today, which we've focused on China's Five-Year Plan, its indigenous innovation policies, and the impact on the American economy and the outsourcing of jobs.

There's an old saying, sometimes we save the best till last, and so in introducing this panel, I want us to keep that phrase in mind.

On this panel, our first witness, and we'll do it in this order, Dr. Ralph Gomory, who is currently a research professor at the Stern School of Business at New York University (NYU).

Before joining NYU Dr. Gomory was for many years the Director of Research of IBM and later IBM Senior Vice President for Science and Technology. After retiring from IBM he was for many years the President of the Alfred P. Sloan foundation.

Dr. Gomory has received many awards and honorary degrees. He was awarded the National Medal of Science by President Reagan. He is a member of the National Academy of Sciences and the National Academy of Engineering, and has served as a trustee of Princeton University. He was a member of the President's Council of Advisors on Science and Technology, PCAST, under President Reagan and under both Presidents Bush.

At present he is a member of the National Academy's Committee on Science Technology, and Economic Policy (STEP). So we're delighted to have him here.

The second witness is Dr. Philip Levy, who is a Resident Scholar at the American Enterprise Institute. I first met Philip, I think you had just left the Council of Economic Advisors staff under President Bush. He now works on AEI's Program in International Economics, which ranges from free trade agreements and trade with China to antidumping policy.

Prior to joining AEI, he worked on international economic issues as a member of the Secretary of State's Policy Planning Staff. He also served as an economist for trade on the President's Council of Economic Advisors and taught economics at Yale University. He writes for AEI's International Economic Outlook series.

Third, but not least, is Mr. Leo Hindery, the Chairman of the U.S. Economy/Smart Globalization Initiative at the New America Foundation.

He's Managing Director of InterMedia Partners, LP, a media industry private equity fund manager, which he first founded in 1988.

He was chairman of the YES Network, the nation's largest regional sports network, which he founded in the summer of 2001, as a television home of the New York Yankees. He's chairman of the U.S. Economy/Smart Globalization Initiative at New America Foundation, a member of the Council on Foreign Relations.

He's also a member of the Board of Visitors at the Columbia School of Journalism, and a director of the Huffington Post Investigative Fund, the Jesuit School of Theology at Santa Clara University, the National Bureau of Asian Research, and the Paley Center for Media and Teach for America.

He was previously an economic and trade advisor to both the campaigns of President Obama and former Senator John Edwards.

So we welcome all three of you, and we've set the clock, eight minute opening statements, and we'll start with Dr. Gomory and then go to Dr. Levy and then Dr. Hindery, and then each Commissioner will have rounds of up to five minutes to ask you questions.

Thank you.

Dr. Gomory.

STATEMENT OF DR. RALPH E. GOMORY
RESEARCH PROFESSOR, STERN SCHOOL OF BUSINESS, NEW YORK UNIVERSITY
NEW YORK, NY

DR. GOMORY: Thank you, again, for the opportunity to take part in this hearing.

The questions proposed to this panel relate to the likely impact of China's actions on this country in the future.

I believe that what we can expect in the future is simply more and probably much more of what we have already seen, and that is rapid economic growth within China with Chinese exports having a major negative

impact on the manufacturing capability of this country; an enormous imbalance of trade, as these Chinese imports are not balanced by a sufficient counter flow of U.S. exports; and in the U.S., strong corporate profits at the price of downward pressure on wages and jobs.

We have also benefited from cheaper consumer goods, but that benefit has come at too high a price, and we've also seen that U.S. global corporations motivated by their normal pursuit of profits are strongly aiding these developments.

Therefore, we must realize that in the present situation, the interests of our global corporations and the interests of our country have, in fact, diverged.

We are slow to see what is happening to this country for several different reasons, and one is that there's a strong and pervasive belief, especially among many of the most educated and influential, that free trade benefits everyone. This benign belief is based on the thought that if two countries are good at different things, both are better off trading than not.

But this argument simply does not address the question of what happens when one country starts to get good at the things that are its trading partners' strengths? And that, of course, is the situation that we are in today with China.

What a more careful analysis of that situation tells us is this: that early in our trading partners' development, that development is, in fact, helpful to both countries, but that later on when that trading partner gets into many of the industries you're good at, further development becomes harmful. Further development of the trading partner becomes harmful.

This more careful theoretical analysis does describe what is now happening, and that it does actually happen has recently been confirmed by the statistics-based analysis of Nobel Prize economist Michael Spence.

This development, and I believe at this point it is harmful, of Chinese productivity is being strongly accelerated by China's effective policy of acquiring technology through joint ventures with U.S. corporations and by China making technology transfer a condition, in fact, for market entry.

In addition, U.S. corporations are increasingly locating their research and their development in China. Also, through subsidies, abated taxes, and mispriced currencies, Chinese exports have acquired a competitive edge that would take much longer to produce by the actual development of superior productivity or might not occur at all.

And this has resulted so far in two to $3 trillion at the disposal of the Chinese government for the purchase of more Treasury notes, et cetera, as in the past, or, as is more likely in the future, for the acquisition of companies and their technology.

In participating in all this, our corporations are simply pursuing the widely-accepted mandate of maximizing profitability. They are playing the

game by the rules of the game, but in this game, as it is presently constituted, the interests of our corporations have diverged from the interests of our country.

Another dangerous delusion is the idea that Americans don't need dull jobs like manufacturing jobs. We will just do design and innovation and let other nations do the grunt work, and this is the theme of the new economy, and it is best described by saying why can't we have an economy made up entirely of things like the Apple iPhone?

You heard a good deal about this already, so I will not go into detail as it's in my testimony. There are really, though, two good reasons why the iPhone is not a model for our economy. One, that such an economy is unattainable. The iPhone is a rare event, and the huge profits we see now are unlikely to last. And the other is that it's not even desirable. Both unattainable and undesirable.

A country of Apples would have only a few high-paying jobs and the rest is retail sales, and this does not provide a foundation for the economy of a great nation.

We need to get used to the idea that there is no effortless road to prosperity. To prosper, a country needs to make a range of important products and services, and then keep after them year after year, constantly learning, improving their capabilities to stay with or ahead of competition.

Many products and services of this sort lack glamour, and they're dismissed as “old hat” or even “commodities.” But they can be products or services of high-value add per person. They may make average profits, but high-value areas with average profit can contribute strongly to wages and to a well-distributed GDP.

In light of all this, we should consider a U.S. national economic strategy that aims to better align the goals of companies with those of the country. An example would be having incentive for companies to have high-value added jobs in the United States. If we want high-added jobs, let us reward our companies for having such jobs.

One way to do this would be to give corporate tax deductions proportioned to the value added created in the U.S. by a company. This advantages a company that creates its value add in the U.S. This is only one of many possibilities to align these disparate goals. And if we start to think in this direction, we will see many others.

Balanced trade is also necessary if we are to control our own economic destiny. For the present unbalanced trade, China can simply pick the productive industries they want to dominate and then take them over using mercantilist tactics while accumulating the one-way flow of currency that results from that for future use.

Yet trade can be balanced. Approaches to this range from jawboning to tariffs. Tariffs are often dismissed out of hand by economists because of

the possibility of retaliatory tariffs from other countries. But Warren Buffett has described a remarkable approach that avoids the retaliatory issue.

Changing the direction we are now headed in will be difficult. Wealthy and powerful segments of our society benefit strongly from the status quo, and that includes the leadership of our major corporations, much of Wall Street, as well as many others to whom both the federal legislature and the administration turn both for advice and for political contributions. Nevertheless, it's what we must do if we are not to continue our downward direction.

Thank you very much.

[The statement follows:]

PREPARED STATEMENT OF DR. RALPH E. GOMORY
RESEARCH PROFESSOR, STERN SCHOOL OF BUSINESS, NEW YORK UNIVERSITY
NEW YORK, NY

Thank you for the opportunity to take part in this hearing of the China Commission. The subjects that we are discussing today are closely related to the topics to which I have devoted much of my working life. For almost 20 years I was the head of the research effort of a major international corporation, (IBM). For the next 18 years I was the head of a major foundation (Alfred P. Sloan) deeply interested in science and technology. In addition for the last two decades I have devoted considerable energy to understanding and writing about the economics of trade.

Many of the questions you have proposed to this panel relate to China's efforts to move its people into more productive jobs where they can create more value for each hour worked, and to the means, ranging from foreign direct investment to direct acquisition of knowledge abroad, that China has used and will use to acquire the technical knowledge that is needed to produce that result. Explicit or implicit in many of the questions is also the question of the impact of these actions on the U.S. and the likelihood of their success in the future. A further implicit question posed is this: What can the U.S. do when these impacts are detrimental to the U.S.?

Summary

I will state here in short form what I will say in a more detailed way below. What we can expect in the future is simply more, and probably much more, of what we have seen to date.

What we have seen to date is this: rapid economic growth in China, coupled with a major negative impact of the imports of Chinese goods on the manufacturing capability of this county. We have seen an enormous imbalance of trade as these imports are not balanced by a sufficient counter-flow of exports. In the U.S. we have seen greater corporate profits, accompanied by downward pressure on wages and employment.

What we have also seen is that U.S. global corporations, in their normal pursuit of profits, are strongly aiding these developments. Therefore it is time to realize *that the interests of these corporations and those of this country have diverged.*

Without a major departure from current U.S. government policies, there is no reason to expect anything in the future from our corporations but again, more of the same.

Confusion Over Free Trade

Why is this happening when there is a strong and pervasive belief, especially among many of the most educated and influential, that free trade benefits everyone; that when you lose manufacturing¸ it is because your comparative advantage is somewhere else, and that it benefits everyone to allow market forces to shift you in the direction of your comparative advantage rather than struggle to keep what you once had.

This view represents a fundamental confusion. In most standard economic models countries have fixed capabilities. In this situation market forces will sort themselves out in the way described and the free market free trade result is beneficial. Unfortunately that does not answer or even address the question we are interested in: What is the effect when a trading partner, in this discussion China, does not hold its capabilities fixed, but rather improves them? Let me state clearly here that economic theory does not say that when your trading partner improves its capabilities, and then you let market forces act on these new capabilities, that the new free trade result is better for your country than where you were before the change. In fact it can be harmful.[49]

What standard models involving change do show, and this is the work that Professor Baumol [50] and I have been engaged in for many years (Reference 1), is this: That the initial development of your trading partner is good for you, but as your trading partner moves from a less developed to a more developed state, things turn around. Their further development becomes harmful to your country. Its impact is to decrease your GDP.

And this result takes into account all the effects. It includes the benefit to consumers of cheaper goods from the newly developed partner (in this case China) as well as the negative impact of losing productive industries in the home country (USA).

Consequently we cannot take refuge, as many do, in simply asserting, is spite of the evidence before their eyes, that China's development is good for the U.S. In fact it is more reasonable to say that theory expects it to have a negative impact with further economic development, and it is further development that is being discussed here.

China's Form of Mercantilism

China's approach to trade cannot be described as free trade. It is traditional mercantilism, a pattern of government policies aimed at advancing Chinese industries in world trade, an approach that has many precedents The effect of mispriced currency, subsidies, and the rapid appropriation of foreign know-how allows many Chinese industries to appear on the world scene with prices and capabilities that would have taken decades (if ever) to attain without the aid of these practices. Professor Shih, who is testifying here today, has well described the destructive effect of these efforts on American industries in some of his writings (Reference 2).

A More Detailed Description

If we look more closely at the development of China we can see what U.S. corporations contribute. We see U.S. corporations, either alone or in joint enterprises with Chinese corporations, building plants in China that enhance both that country's' productive abilities and its technical know how. We have seen the goods imported from these enterprises contribute largely to the enormous imbalance of trade since these imports are not balanced by a sufficient counter-flow of exports. We see that today this has resulted in 2 to 3 trillion dollars at the disposal of the Chinese government for the purchase of more treasury notes etc. as in the past, or, as is more likely in the future, for the acquisition of companies and their technology.

In addition, we see U.S. corporations increasingly locating their research and development in China. This is a further and very direct way for China to acquire the necessary know how.

[49] This has been pointed out by many distinguished economists, most recently by Paul Samuelson in Reference[7]
[50] Professor William J. Baumol, New York University

The Consequences

While many economists have been slow to realize that all is not well, we now have this from the Nobel Prize winning economist Michael Spence writing in a widely noticed paper: (Reference 3)

"Until about a decade ago, the effects of globalization on the distribution of wealth and jobs were largely benign ……. Imported goods became cheaper as emerging markets engaged with the global economy, benefiting consumers in both developed and developing countries.

But as the developing countries became larger and richer,.. they moved up the value-added chain. Now, developing countries increasingly produce the kind of high-value-added components that 30 years ago were the exclusive purview of advanced economies.

The major emerging economies are becoming more competitive in areas in which the U.S. economy has historically been dominant, such as the design and manufacture of semiconductors, pharmaceuticals, and information technology services.

At the same time, many job opportunities in the United States are shifting away from the sectors that are experiencing the most growth and to those that are experiencing less. The result is growing disparities in income and employment across the U.S. economy, ……The U.S. government must urgently develop a long-term policy to address these distributional effects and their structural underpinnings and restore competitiveness and growth to the U.S. economy."

Spence reached these conclusions from a careful analysis of government statistics.

With this type of analysis of statistics as well as theory and the evidence of our own eyes, why do thing continue unchanged? To see why we must look at the motivation of the American corporation.

Why Corporations Choose China

We might wonder why U.S. Corporations are playing such a strong role in the development of China is spite of the fact that it is very likely to have a negative impact on the U.S. However this is a direct outcome of the present dominant beliefs of the two countries.

The Chinese government, as their five-year plan shows, is focused in having in their country the leadership of most major and growing industries. In the U.S. in contrast the dominant ideology is laissez-faire; there is a faith that the U.S. corporations, venture capitalists, etc. if left alone, will through the pursuit of profit create the greatest GDP for the country.

Such a complete hands-off policy was not in fact the belief in the earliest days of this country. Initially the mercantilist policies of Britain aimed to keep the colonies as suppliers of natural products while manufacturing and shipping were to the greatest extent possible reserved to the British. After the Revolutionary War, however, Alexander Hamilton urged, eventually successfully, the adoption of protectionist measures to shelter the start of manufacturing in the newly formed independent country.

There have been other periods of protectionism in our history, but most of the time the natural protection of great distance and poor transport has been enough.

Today, with container ships and optical fibers, we are in an entirely a different world. Today a global corporation can maximize its profits by sourcing its products or services wherever they can be obtained the cheapest, and sell them wherever the demand is greatest.

The Chinese government, as Singapore did before, makes intelligent use of this motivation. Through direct subsidies, abated taxes, and mispriced currency they can supplement cheap labor to the point where China it becomes the most profitable place to locate the industries China is interested in. China is also able to add to this the lure of a giant growing market and to make, in practice, technology transfer a condition for market entry.

Our corporations, aiming to maximize profit and shareholder value, only hesitate at the thought that the companies they are helping to found might become their future competitors. But in the end it is not surprising that corporate leadership finds the bird in the hand superior to the two in the bush, since profits are reported quarterly, not every five years. Our present executive compensation policies for executives, strongly tied to stock price, then strongly reward these decisions.

Nor is there any strong reason for our corporations to believe that they are harming their country. Our own government, ignoring in practice Chinese mercantilist policies, has clearly supported the notion of free trade and has even in its official pronouncements supported the idea that outsourcing is good for the country.

Even the rapid decline of the manufacturing sector, which makes up a large part of international trade, has, until very recently, not caused many cracks in the wall of opinion and self-interest that protects the laissez faire status quo.

I want to make clear that our corporations themselves are neither greedy nor evil, though there are people who ascribe our problems to these qualities. In fact they are simply pursuing the widely accepted mandate of maximizing profitability. They are playing the game by the rules of the game. But in this game, as it is presently constituted, *the interests of our corporations have diverged from the interests of our country.*

Rationalization of the Status Quo

I will not catalog here the many rationalizations that enable people to look at this scene and see nothing to worry about. I will, however, discuss one briefly – the notion of the "New Economy" since it appears so often. This is the idea that we in the U.S. don't need dull jobs like manufacturing jobs, we will just do design and innovation and let other nations do the grunt work.

The poster child for this is the Apple iPhone. The iPhone was far from being the first smartphone but it was the one that finally got things right and the result was explosive growth. It is beautifully designed, a collection of parts from different areas of Asia, assembled in China. The high tech components come from Japan, Korea, and Taiwan, the low-tech assembly from China, and the whole can be sold way above the cost of the assembled parts because the designers finally got it right.

Advocates of the New Economy ask in essence - Why can't our whole economy be like that? Why can't the country design wonderful products for the world and let them be built in Asia and sold around the world?

There are only two reasons: One is that a whole economy like that is unattainable; the other is that a whole economy like that is undesirable.

Why is it unattainable? There are two things we must realize: first the huge profits are unlikely to last. Others can and do imitate. The Google Android has already edged ahead in the smartphone race. Second, events like the iPhone are rare; we will never have a country in which most of the companies are like today's Apple. Apple itself was not like today's Apple until it hit the iPhone. To imagine a country of Apples is somewhat like going to a baseball game and watching Babe Ruth hit three home runs and then turning to your neighbor and saying "I've got a great idea for a winning team, lets have a team of all Babe Ruths."

Why is it not desirable? Except for a small number of designers, and the retailers who sell the iPhone in the United States, most of the jobs are in other countries. The huge profits, while they last, benefit the shareholders; there is little contribution to jobs or wages in the U.S. Since most stock is held by those who are already wealthy (Reference 4), an all-Apple America would be a country of a few rich stockholders and a huge low-paid lower class.

There is no Royal Road to Prosperity

We need to get used to the idea that there is no effortless road to prosperity. To prosper a country needs to make a range of good products and services, and then keep after them year after year, constantly learning, and improving their capabilities to stay with or ahead of competition. Many products and services of this sort are dismissed as "commodities" but many things we want to consume are of this type. But commodities can be products or services of high value add per person. They may not be immensely profitable, but profits are not the only thing. High value areas with average profit can contribute strongly to wages and to a widely distributed GDP. And maintaining technical capabilities in competitive areas allows entry into new industries as the technology advances and finds new uses and starts new industries (References 2 and 6).

What Can Be Done to Change this Downward Direction?

I will not discuss here the usual suggestions about better education and more R&D. Proposals of this sort about education and R&D can be helpful. They can only be harmful if they create the mistaken belief that these measures alone can deal with the problem.

The main thrust of this testimony, however, points to the divergence of company goals, focused almost exclusively on profit, and the broader goals of greater GDP and less inequality in the United States. Therefore, we need to turn our attention not only to the familiar suggestions I have just listed, but also to the issue of better aligning corporate and national goals.

Aligning Country and Company

We need to consider a U.S. national economic strategy that includes incentives for companies to have high value-added jobs in the United States. If we want high value-added jobs, let us reward our companies for producing such jobs - whether they do that through R & D and advanced technology, or by just plain American ingenuity applied in any setting whatsoever.

The Asian countries have attracted companies by individual deals with individual companies. We do not have either the tradition or the knowledge or the inclination in the U.S. government to do that. An approach that is better suited to what the United States can do is to use the corporate income tax. We have already used the corporate income tax to spur R&D, so let us use it to directly reward what we are aiming at: High value-added jobs.

One way to do this is to give a corporate tax deduction proportioned to the value added created in the U.S. by a company. Consider two equal size companies, one chooses to send half its work overseas; the other keeps the work in the U.S. The second company will receive double the deduction on its income tax, that the offshoring one receives. The effect can be made as strong or as weak as is desired.

Clearly this is only one possibility, if we think in this direction we will find many others.

Balancing Trade - Controlling our own Destiny

If the imbalance of trade continues there is nothing to stop the current trend of transferring ever more wealth and power to foreign governments to balance the import of underpriced foreign goods. On the other hand, if trade is balanced, the value of goods imported is matched to the value of goods exported from the country; and those goods and services are provided by jobs in the U.S.

Balanced trade is necessary if we are to control our own economic destiny. Without it China or other countries can simply pick the productive industries they want to have as their own country and take them over through the usual mercantilist tactics of subsidies, special tax concessions, etc. while accumulating the flow of currency for future use.

What the trade model alluded to earlier also shows is that the ideal position for a country is in fact to be the producer in the most productive industries, while leaving a certain proportion of others to its trading partner. This provides a high standard of living for the country that succeeds in doing this and a much lower one for its trading partner. At present China is the country headed in that dominating direction with its five-year plan, and we are the candidate to be the poorer trading partner with our laissez faire policies. This outcome can be avoided if we prevent these takeovers and keep a substantial proportion of productive activities for ourselves. But this requires balanced trade.

There is of course a litany of approaches to balancing trade ranging from jawboning to tariffs. Tariffs are often dismissed out of hand by economists because of the possibility of retaliatory tariffs from other countries. I only observe here that the approach well described by Warren Buffet (Reference 5) has the remarkable attribute that, if adopted by others as a retaliatory measure, the result is not the destruction of trade, but only balanced trade.[51]

Balanced trade is essential, it can be attained, but at present it is not a recognized goal of either Congress or the Administration.

On Departing from the Status Quo

Changing the direction we are now headed in will be difficult. Wealthy and powerful segments of our society benefit from the status quo and that includes the leadership of our major corporations and many others to whom the both the Federal legislature and the Administration turn for advice.

Conclusion

To deal successfully with the effect on this country of the rapid industrialization of China, our government needs to take steps to better align the goals of our corporations with the aspirations of our people.

In a globalizing world where nations such as China advance their national interests with well thought out mercantilist policies, it becomes essential to balance trade if we are to control our own destiny. This too calls for new government policies.

I am grateful to the members of the China Commission for inviting me to contribute to their thinking on these matters.

[51] In fact, a bill based on the Buffet approach was introduced into the Senate by Senator Dorgan and Senator Feingold in 2006. The bill was S.3899, "The Balanced

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HEARING CO-CHAIR MULLOY: Thank you, Dr. Gomory.

Dr. Levy.

STATEMENT OF DR. PHILIP I. LEVY
RESIDENT SCHOLAR, AMERICAN ENTERPRISE INSTITUTE
WASHINGTON, DC

DR. LEVY: Mr. Chairman, members of the Commission, thank you very much for the opportunity to appear today to discuss the economic implications of China's efforts to boost its technological prowess. China has adopted stances such as its indigenous innovation policies to advance that country from its status as a prolific but low-end producer of manufacturers to a position of technological leadership.

These policies ought to be a real source of concern for the United States. They may well prove costly to American firms, but there are limits to how costly they can be. I believe China is unlikely to achieve its objective of vaulting to the forefront of global innovation, a spot that the United States has traditionally enjoyed.

The costs, instead, will be extracted from the gains that American firms would otherwise enjoy in the Chinese market. Contesting this policy should be a principal focus of U.S. commercial diplomacy with China.

In my brief remarks this afternoon, I will focus not on the details of how China has implemented its policies but on the broader economic ramifications.

We should ask not only whether China is trying to achieve technological leadership and to grow national champions--it is--but also whether such a policy is likely to succeed, and what the policy will mean for the well-being of the United States?

There's a long history of state-sponsored attempts to grab technological leadership, from Soviet steel factories to European aircraft consortia. The key question is how we measure the success or failure of such plans? Is it the ability to make a commercial sale in a technologically-advanced product category? If so, success is virtually assured.

If instead we measure whether society gets a reasonable return on its investment or whether the infant industry grows into a viable and thriving and mature industry or whether the country captures economic rents on the world stage that more than make up for its initial investment, then the prospects of success are very much in question.

Even if China were to succeed in creating new innovative sectors, it is by no means obvious what this success would imply for U.S. well-being. One can certainly construct economic scenarios in which a technological leader reaps inordinate gains, but one can also construct scenarios in which innovative industries spread their benefits globally, not just locally, and in this latter case, outsized Chinese investments in technological development would benefit, not hurt, the United States.

China has used its indigenous innovation policies in support of domestic industries to try to move to the technological forefront in manufacturing. The indigenous innovation policies seek to leverage access to the large Chinese government procurement market. A central and troubling feature of the policies is that they seem intent on extracting foreign technology as the price of access to that Chinese market.

By prompting firms to reveal their technological secrets, either through official disclosure or joint venture arrangements, foreign investors may lose valuable intellectual property advantages.

There are a couple broad points, though, worth noting about the indigenous innovation policies. One, the policies are malleable and clearly in a state of flux; and, two, they represent just one aspect of the broader push to stimulate Chinese innovation although most of it seems to be at foreign expense.

Another implication of the rapid pace at which the policies are evolving is that the economic impact is particularly difficult to analyze. I would argue, however, that the Chinese approach to indigenous innovation is unlikely to succeed in its broader aims.

The vibrant and innovative U.S. technology industry owes its success to a number of factors. It's benefited from federal support for basic research, of course; from independent and successful research universities; from a community of scholars and researchers drawn from around the world;

from strong intellectual property protections; and from a competitive market environment that allows entrepreneurs to emerge and to thrive.

This is the antithesis of an approach that stifles the competitive environment, names national champions, and at least tacitly condones intellectual property theft. The environment that China is creating is unlikely to attract top research talent from around the world, for example, since such innovators generally value their intellectual freedom and independence.

The weak protections for intellectual property will offer few incentives, even for Chinese firms, to invest heavily in risky new ventures. There's little history to indicate that cutting-edge technology can emerge from a stultifying government-dominated approach.

This would be true if China were already a market leader trying to protect its advantage. It is even more true when China is a technological laggard trying to catch up.

Appropriation of other countries' technological advances can facilitate catch-up, but it is distinctly different from crafting a set of policies that will turn a country into a world leader.

Let me close by considering the question of what Chinese leadership in a high-technology sector might mean, particularly for the United States. I have argued and would argue that such lasting leadership is unlikely to be achieved without a complementary set of policies more conducive to innovation.

But let us suppose for the sake of argument that China does ascend to the technological mountaintop in some key sector, just on the basis of massive government support, and suppose that this support let Chinese scientists overcome an important technological obstacle that had stymied competing scientists around the world.

What would that mean for the United States? Well, the worst case scenario is that China would be the sole producer of this key product and would be able to charge high prices to all comers, extracting monopoly rents.

To do that, though, the Chinese sector would need to keep its solutions from being known all around the world, lest it lose its edge. In economic parlance, the spillovers of technological innovation have to be local, not global.

In fact, though, the ample literature on technological diffusion frequently finds that spillovers are global, not local, just the reverse. One seminal paper by Pete Klenow and Doug Irwin on the semiconductor industry, for example, found that--and I'm quoting here--"learning spills over just as much between firms in different countries as between firms in a given country."

In semiconductors, Klenow and Irwin also found there was very limited

evidence of spillovers from one generation of chip to the next; thus, grabbing a technological lead at one moment did not seem to ensure leadership thereafter.

Nor were Klenow and Irwin alone in showing the difficulty of meeting the requirements of successful government intervention. Eaton and Grossman famously disabused enthusiasts of strategic trade policy in the '80s through showing the sensitivity of the model to theoretical variations.

Paul Krugman helped lead an empirical search for candidates for government support in trade, a search that came up empty, in his judgment.

We can certainly construct theoretical examples in which government investment in an industry pays off many times over, but the strong theoretical assumptions that are needed to make such a case rarely seem to apply in practice.

Failures and missteps are rampant when the government backs the wrong technology or the wrong firm or doesn't know when to call it quits. Even when the government succeeds, technological leadership is transitory, not permanent.

These are the problems that have cast doubt on the advisability of industrial policies for decades.

So, in conclusion, China is approaching the issue of technological leadership from a position of weakness, not strength. It faces a broad range of concerns about its economic future, is concerned about the economic effects of being relegated to a position of eternal cheap, low-end manufacture.

The U.S. and China share an interest in seeing China emerge as a prosperous technological innovator. This emergence should come about through creation of an environment that supports basic research and international collaboration that provides for intellectual freedom and facilitates entrepreneurial competition.

It should not come about through the expropriation of foreign technology. China's indigenous innovation policies represent a serious misstep along this path. The policies do not threaten U.S. technological leadership in the long run, but they do threaten to impose substantial costs on U.S. businesses in the short run.

The willingness of Chinese leaders to rethink some aspects of this policy is welcome, but it remains to be seen whether it represents a sufficiently thorough reorientation.

Thank you.

[The written statement follows:]

PREPARED STATEMENT OF DR. PHILIP I. LEVY
RESIDENT SCHOLAR, AMERICAN ENTERPRISE INSTITUTE
WASHINGTON, DC

Chairman Mulloy, Chairman Slane, and Members of the Commission, thank you for the opportunity to appear today to discuss the economic implications of China's efforts to boost its technological prowess. China has adopted stances, such as its "indigenous innovation" policies, to advance the country from its status as a prolific, but low-end, producer of manufactures to a position of technological leadership.[52] In 2006, China released "The National Medium- and Long-Term Plan for the Development of Science and Technology (2006-2020)" which included the call for scientific advancement because "despite the size of our economy, our country is not an economic power, primarily because of weak innovative capacity."[53]

These policies ought to be a real source of concern for the United States. They may well prove costly to American firms, but there are limits to how costly they can be. They are unlikely to achieve their objective of vaulting China to the forefront of global innovation, a spot that the United States has traditionally enjoyed. The costs, instead, will be extracted from the gains that American firms would otherwise enjoy in the Chinese market. Contesting this policy should be a principal focus of U.S. commercial diplomacy with China.

In my brief remarks, I will focus not on the details of how China has implemented its policies, but on the broader economic ramifications. We should ask not only whether China is trying to achieve technological leadership and grow national champions – it is – but also whether such a policy is likely to succeed and what the policy will mean for the well-being of the United States. There is a long history of state-sponsored attempts to grab technological leadership, from Soviet steel factories to European aircraft consortia. The key question is how we measure the success or failure of such plans. Is it the ability to make a commercial sale in a technologically advanced product category? If so, success is virtually assured. If, instead, we measure whether society gets a reasonable return on its investment, or whether the infant industry grows into a viable and thriving mature industry, or whether the country captures economic rents on the world stage that more than make up for its initial investment, then the prospects of success are very much in question.

Even if China were to succeed in creating new innovative sectors, it is by no means obvious what this success would imply for U.S. well-being. One can certainly construct economic scenarios in which a technological leader reaps inordinate gains. But one can also construct scenarios in which innovative industries spread their benefits globally, not just locally. In this latter case, outsized Chinese investments in technological development would benefit, not hurt, the United States.

China's motivation

China's insecurity about its place on the technological ladder may seem puzzling. After decades of double-digit economic growth, a relatively smooth ride through the recent global financial crisis, and sitting astride a growing mountain of foreign exchange reserves, China often appears to be a paragon of economic accomplishment. Yet China faces enormous challenges. For all its advances, it remains a relatively poor country. According to the World Bank, China's per capita income in 2009 was under $4,000, less than 1/10 that of the United States.[54] One common description of the problem facing China is that it is racing to get rich before it gets old. The race is a daunting one

[52] There are two excellent and comprehensive recent analyses of China's indigenous innovation policies: McGregor, James "China's Drive for Indigenous Innovation: A Web of Industrial Policies," July 2010, http://www.apcoworldwide.com/content/PDFs/Chinas_Drive_for_Indigenous_Innovation.pdf; and United States International Trade Commission, "China: Intellectual Property Infringement, Indigenous Innovation Policies, and Frameworks for Measuring the Effects on the U.S. Economy," Publication 4199, November 2010, http://www.usitc.gov/publications/332/pub4199.pdf

[53] McGregor 2010, p. 4.

[54] World Bank, GNI Per Capita, Atlas Method (Current US$), http://data.worldbank.org/indicator/NY.GNP.PCAP.CD. China's 2009 figure – the latest data available – was $3,650; the comparable United States figure was $46,360.

because China is aging at an extraordinary rate.[55] It is careening toward a future in which a shrinking population of workers will have to support a growing population of dependents.

China's recent dominance of the global manufacturing scene is neither as secure nor as lucrative as it may seem. Prices and wages are rising in China and the supply of young, pliable workers who streamed from the interior of the country to work in the coastal factories has begun to dry up. There are newcomers such as Vietnam and Bangladesh eager to take China's place. Further, China's impressive export statistics and participation in production of advanced products often concealed a much smaller role when carefully assessed.

One such recent, striking illustration of the source of China's concern came in a U.S. study of Apple iPods. The researchers attempted to disentangle the value chain used to produce a 30GB Video iPod, with inspiration from Apple Computer in the United States, parts from suppliers around the world, and assembly in China. They found that for an iPod with $194 in "captured value" $80 went to Apple and $4 went to the manufacturers in China.[56]

Adam Segal of the Council on Foreign Relations provides a complementary example: "(F)or every Chinese-made DVD player sold, the Chinese manufacturer must pay a large royalty fee to the European or Japanese companies that patented various components of the unit, such as its optical reader. These foreign firms reap substantial profits, but the Chinese take is extremely small – and is shrinking further as energy, labor, and commodity prices rise."[57]

The purpose of exploring the motivations behind China's indigenous innovation policies is not to evoke sympathy for China's plight but to understand the forces behind the drive to improve China's status as an innovator. A policy such as this, based on fundamental Chinese concerns about the plight of their nation, will not be easily redirected. A diplomatic strategy to tackle these problematic policies will need to simultaneously address these Chinese concerns.

The Chinese Quest for Technological Advancement

China has used its indigenous innovation policies and support of domestic industries to try to move to the technological forefront in manufacturing. The indigenous innovation policies seek to leverage access to the large Chinese government procurement market. To leverage this market and spur Chinese innovation, in November 2009, the relevant Chinese ministries announced that there would be a national catalogue of products that met the criteria of "indigenous innovation." The criteria dealt with the source and status of the intellectual property contained in the product, such as whether it was registered and owned in China. The effect was to favor home-grown firms over foreign ones. The Shanghai version of the catalogue listed 258 products, for example, of which only two were from manufacturers with foreign investment.[58]

A central and troubling feature of the policies is that they seem intent on extracting foreign technology as the price of access to the Chinese market. By prompting firms to reveal their technological secrets through either official disclosure or joint venture arrangements, foreign investors may lose valuable intellectual property advantages. Arguing for the centrality of this approach to the broader policy, McGregor cites the aforementioned Chinese Medium- and Long-Term Plan from 2006: "One should be clearly aware that the importation of technologies

[55] See Nicholas Eberstadt, "The Demographic Future," *Foreign Affairs*, November/December 2010. http://www.foreignaffairs.com/articles/66805/nicholas-eberstadt/the-demographic-future

[56] Dedrick, Jason, Kenneth L. Kraemer, and Greg Linden, 2008, "Who Profits from Innovation in Global Value Chains? A Study of the iPod and notebook PCs," Alfred P. Sloan Foundation Industry Studies, http://web.mit.edu/is08/pdf/Dedrick_Kraemer_Linden.pdf. Table 4, p. 21.

[57] Segal, Adam, "China's Innovation Wall: Beijing's Push for Homegrown Technology," *Foreign Affairs* online, September 28, 2010. http://www.foreignaffairs.com/articles/66753/adam-segal/chinas-innovation-wall

[58] McGregor, 2010, p. 19.

without emphasizing the assimilation, absorption and re-innovation is bound to weaken the nation's indigenous research and development capacity."[59] The USITC notes the "concern that foreign companies will need to share sensitive and proprietary technology with Chinese firms or government agencies in order to reap the full benefits of their investments in China."[60]

There are two broader points worth noting about the indigenous innovation policies: 1. The policies are malleable and in a state of flux. 2. The catalogues and circulars describing government purchasing preferences are just one aspect of the broader push to stimulate Chinese innovation, largely at foreign expense.

The malleability of the policies suggests that this is an area in which diplomatic pressure could have an effect. The Chinese Ministry of Science and Technology requested comments on its initial and subsequent indigenous innovation regulations. In April 2010, the rules of 2009 were revised, partially responding to criticisms that had been lodged against the initial policy.[61] Chinese leaders promised further revisions at the December 2010 meeting of the U.S.-China Joint Commission on Commerce and Trade (JCCT).[62] In January 2011, as an outcome of the summit meeting between Presidents Obama and Hu:

> "The United States and China committed that 1) government procurement decisions will not be made based on where the goods' or services' intellectual property is developed or maintained, 2) that there will be no discrimination against innovative products made by foreign suppliers operating in China, and 3) China will delink its innovation policies from its government procurement preferences.
>
> China agreed to eliminate discriminatory "indigenous innovation" criteria used to select industrial equipment for an important government catalogue prepared by the Ministry of Industry and Information Technology, to ensure that it will not be used for import substitution, the provision of export subsidies, or to discriminate against American equipment manufacturers in Chinese government programs targeting these products."[63]

If they were to be taken at face value, these commitments would sound enormously promising. But their true value will depend heavily on the way they are implemented. Just this month there was one early indication of China's intent when the United States Trade Representative's Office announced that China would end subsidies for wind power equipment, to which the United States had objected.[64]

The importance of implementation highlights the importance of the second point – the interconnected set of Chinese policies that are directed at the broader goal of advancing Chinese innovation and disadvantaging foreign firms with leading-edge technology. Other related policies include weak enforcement of intellectual property rights protections for firms operating in China, biased standard-setting, support for Chinese state-owned enterprises to serve as "national champions," and the potential interplay between China's anti-monopoly law and the intellectual

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[59] McGregor, 2010, p. 4.
[60] USITC, 2020, p. 5-5.
[61] U.S.-China Business Council, "China Proposes Partial Solution to Indigenous innovation Issues," April 12, 2010. http://www.uschina.org/public/documents/2010/04/indigenous-innovation-memo.html
[62] U.S. Department of Commerce, "21st U.S.-China Joint Commission on Commerce and Trade Fact Sheet," December 2010. http://www.commerce.gov/node/12467
[63] White House Office of the Press Secretary, "Fact Sheet: U.S.-China Economic Issues," January 19, 2011. http://www.whitehouse.gov/the-press-office/2011/01/19/fact-sheet-us-china-economic-issues
[64] USTR, "China Ends Wind Power Equipment Subsidies Challenged by the United States in WTO Dispute," Press Release, June 2011.

property regime.[65] Thus, the implementation question concerns not only revisions to indigenous innovation catalogues but a much broader set of governance tools that can be used to achieve similar ends.

The impact on the United States

One implication of the rapid pace at which the policies are evolving is that the economic impact is particularly difficult to analyze.

> "Many policies remain in draft form, many of the implementing regulations for major laws are still not in place, and enforcement of most indigenous innovation policies has not yet begun. Much of the concern thus reflects fear of future Chinese policies and of the way new laws may be implemented, and not simply objections to policy actions that the Chinese government has already taken. It remains unclear how the effects of the new policies will play out."[66]

A first, important point to establish, however, is that the Chinese approach to indigenous innovation is unlikely to succeed. The vibrant and innovative U.S. technology industry has benefited from federal support for basic research, from independent and successful research universities, from a community of scholars and researchers drawn from around the world, from strong intellectual property protections, and from a competitive market environment that allows entrepreneurs to emerge and thrive. This is the antithesis of an approach that stifles the competitive environment, names national champions, and at least tacitly condones intellectual property theft. The environment that China is creating is unlikely to attract top research talent from around the world, for example, since such innovators generally value their intellectual freedom and independence. The weak protections for intellectual property will offer few incentives even for Chinese firms to invest heavily in risky new ventures.

One recent report described the fascination in China with Apple Computer and its new iPad. "Some members of China's top legislative bodies have expressed worries as to whether China will be able to match companies like Apple, as the country – like the rest of the world – has been enthralled by the succession of innovative products from the California-based company."[67]

But would any government have been able to pick Apple as a future technological leader? It is worth noting that a decade ago, on the eve of the introduction of the iPod, Apple hardly looked like a likely candidate for such success. It was struggling. It produced a computer with an elegant operating system but a declining share of the personal computer market. Having apparently lost the desktop battle to Microsoft Windows, Apple was more often cited as a case study for how not to approach a technology market. And yet, through the introduction of the iPod, iPhone, and iPad, Apple revived its fortunes and prospered. Had one been looking for a technology champion to support in 2001, one would have looked elsewhere. In corresponding fashion, some of the technology giants of decades past have faded into obsolescence. There is a fundamental unpredictability about which firms are going to come up with new and market-leading technologies. This puts a centrally-planned approach at a distinct disadvantage.

There is little history to indicate that cutting-edge technology can emerge from a stultifying government-dominated approach. This would be true if China were already a market leader, trying to protect its advantage. It is even more true when China is a technological laggard trying to catch up. Appropriation of other countries' technological advances can facilitate catch-up, but it is distinctly different from crafting a set of policies that will turn a country into a world leader.

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[65] USITC, 2010, pp. xx and 5-6 and McGregor, 2010, p. 23.
[66] USITC, 2010, p. 5-2.
[67] Su, Andre, "Where is China's Apple?" *Want China Times*," March 5, 2011. http://www.wantchinatimes.com/news-subclass-cnt.aspx?cid=1101&MainCatID=11&id=20110305000083

The inadvisability of China's approach to the promotion of innovation provides an opening for diplomatic dialogue. An alternative approach that shunned intellectual property theft, protected innovators of all nationalities, and supported basic research would be beneficial for both China and the West. It also means that the economic impact on U.S. firms investing in China can be analyzed in a more conventional way. For such firms, China's as-yet-ill-defined policies can be thought of as a means of extracting a higher price for participating in the Chinese market.

Imagine a firm that estimated the net present value of future profits in the Chinese market at $2 billion. Suppose China's indigenous innovation policies effectively compelled that firm to turn over intellectual property worth $1 billion. This would leave the firm distinctly worse off than without the policies, but still distinctly better off than if it were to abandon the Chinese market. If the price of participation were a technology worth $3 billion, however, the firm would be better off leaving the Chinese market. This suggests that the present value of expected profits of U.S. high technology firms in the Chinese market provides an upper bound to the economic cost of Chinese policies. This could be very substantial, but it is much more modest than the costs of a world in which the United States hands over technological leadership to China.

There are a number of objections to this reasoning that can be grouped into 'reasons that firms cannot walk away from China.' They are described by the USITC report:

> "First, China is the world's largest and fastest-growing market, making it critical for global companies to remain active there. Second, U.S. industry representatives believe that even if they were to refrain from operating in China, their global competitors would fill the gap, leading to both large revenue losses and the likelihood that Chinese companies would be able to access similar IP elsewhere. Finally, in some industries, technology advances so quickly that by the time foreign companies in China are competing against technology stolen from them, they expect to be ready with a new generation of technology, so the stolen IP is no longer a critical competitive factor. In any event, because U.S. and other foreign firms are certainly profiting from their ongoing participation in the Chinese market, their shorter-term interest in maximizing current profits may encourage them to set aside their longer-term concerns regarding IP infringement and market access."[68]

Taking each of these points in turn: First, the argument that China is a large market recalls the old joke about a businessman who acknowledged that he would lose money on each sale, but planned to make it up on the volume. It is profitability that matters. It is entirely possible to have a large, growing, competitive market that delivers little profit to participants.

Second, if an industry has close competitors whose technology serves as a close substitute, then it matters little whether that technology is in the hands of China or the original competitors; the U.S. firm would not seem to have much of an edge.

Third, the argument that technology rapidly becomes obsolete simply implies that there are limits to the costs China can impose by compelling technology transfer. This argument, in fact, explains why firms would not need to walk away from China.

The final argument is an intriguing one. It suggests that technology firms will be myopic and overemphasize short-term gains relative to long-term costs. This is odd on at least two counts. Technology firms are generally in the business of balancing the short and the long term, since they must make large up-front investments (e.g. billions of dollars in developing a new semiconductor chip technology and fabrication plant) that will only pay off over time. If the firms are bad at such calculations, they have much deeper problems than China's intellectual property

[68] USITC, 2010, p. 5-23.

environment. Further, what matters is the relative myopia of the private sector relative to governments. One way to interpret China's pursuit of indigenous innovation is as a myopic mistake, an impatient effort to jump to the head of the world technology standings rather than developing an environment that is truly conducive to innovation and scientific development.

Should the United States feel threatened or thankful?

Finally, let us turn from the substantial costs that China can impose on U.S. firms through distortionary policies to the question of what Chinese leadership in a high technology sector might mean. It was argued earlier that such lasting leadership is unlikely to be achieved, without a complementary set of policies more conducive to innovation, such as intellectual freedom and IPR protection. Suppose, though, that China does ascend to the technological mountaintop in some key sector, just on the basis of massive government support. Suppose this support let Chinese scientists overcome a technological obstacle that had stymied competing scientists around the world? What would that mean for the United States?

The worst case scenario is that China would be the sole producer of this key product and would be able to charge high prices to all comers, extracting monopoly rents. To do that, though, the Chinese sector would need to keep its solution from becoming known around the world, lest it lose its edge. In economic parlance, the spillovers of technological innovation have to be local, not global.

In fact, the ample literature on technological diffusion frequently finds that spillovers are global, not local. One seminal paper by Klenow and Irwin on the semiconductor industry, for example, found that "learning spills over just as much between firms in different countries as between firms in a given country."[69] In semiconductors, Klenow and Irwin also found that there was very limited evidence of spillovers from one generation of chip to the next. Thus, grabbing a technological lead at one moment did not seem to ensure leadership thereafter. Nor were Klenow and Irwin alone in showing the difficulty of meeting the requirements of successful government intervention. Eaton and Grossman famously disabused enthusiasts of strategic trade policy through showing the sensitivity of the model to theoretical variations.[70] Paul Krugman helped lead an empirical search for candidates for government support in trade, a search that came up empty.[71]

We can certainly construct theoretical examples in which a government investment in an industry pays off many times over, but the strong theoretical assumptions that are needed to make such a case rarely seem to apply. Failures and missteps are rampant, when the government backs the wrong technology or the wrong firm. Even when the government succeeds, spillovers are often global, not local. Technological leadership is transitory, not permanent. These are the questions that have cast doubt on the advisability of industrial policies for decades.

Conclusion

China is approaching the issue of technological leadership from a position of weakness, not strength. It faces a broad range of concerns about its economic future and is concerned about the economic effects of being relegated to a position of eternal, cheap, low-end manufacture.

The United States and China share an interest in seeing China emerge as a prosperous technological innovator. This emergence should come about through creation of an environment that supports basic research and international

[69] Irwin, D.A. and Klenow, P.J. 1994. "Learning-by-Doing Spillovers in the Semiconductor Industry." *Journal of Political Economy* 102(6): 1200-1227.
[70] Eaton, J., and G. Grossman. 1986. "Optimal trade and industrial policy under oligopoly." *Quarterly Journal of Economics* 101:383-406.
[71] Krugman, Paul, and Alasdair Smith, eds., Empirical Studies of Strategic Trade Policy, University of Chicago Press, 1994.

collaboration, provides for intellectual freedom, and facilitates entrepreneurial competition. It should not come about through the expropriation of foreign technology. China's indigenous innovation policies represent a serious misstep along this path. The policies do not threaten U.S. technological leadership in the long run, but they do threaten to impose substantial costs on U.S. businesses in the short run.

The willingness of China's leaders to rethink some aspects of this policy is welcome, but it remains to be seen whether it represents a sufficiently thorough reorientation. Such a reorientation is likely to require a sustained and focused prioritization of the issue in U.S. commercial diplomacy.

HEARING CO-CHAIR MULLOY: Dr. Levy, thank you for your testimony, and I'm sure there will be a lot of questions when we get into this.

Mr. Hindery, thank you very much for being here. I look forward to your opening statement.

STATEMENT OF MR. LEO HINDERY
CHAIRMAN OF THE US ECONOMY/SMART GLOBALIZATION INITIATIVE AT THE NEW AMERICA FOUNDATION
WASHINGTON, DC AND
MEMBER OR THE COUNCIL ON FOREIGN RELATIONS
NEW YORK, NEW YORK

MR. HINDERY: Commissioners, thank you for this privilege.

Right now three fundamental premises underpin America's overall global economic and trade policies. In my opinion, all are faulty to one degree or another, especially as they relate to our overriding trade relationship with China, and they all affect how the U.S. pursues its now largely misguided approach to economic relations with China.

The first premise is that advancing the interests of America's multinational corporations always benefits American workers and in turn the American economy.

Dr. Gomory has already addressed the often disconnect between big business interests and the best interests of the country, which has largely removed employees and the nation from the responsibility mandate, in truth left only shareholders and management. I concur wholeheartedly with Ralph and would only point out that in order to reconnect the two, we especially need to do away with excessive corporate compensation, which in my opinion is driving U.S. business leadership into all kinds of selfish behaviors.

For decades, CEO compensation, of which I've been the beneficiary, as compared to average employee compensation, was around 20 to one. Now it is consistently 400 to one, with all the selfish behaviors which that has produced, most notably, in my opinion, the mindless offshoring of American manufacturing jobs and a lack of acumen for looping together domestic R&D and innovation with actual production here in the United States.

The second premise is that the rules-based free-trading system

favored by the United States combined with the overall rule of country comparative advantage will result in balanced globalization for all trading partners, especially to the advantage of American workers and again the American economy.

This premise works well when all nations play by the same rules. However, we know that China especially continues to pursue mercantilist policies that are at best anticompetitive and frankly often illegal. Much has been written about how China has gained unfair trade advantages through its abysmally low direct labor costs, its lack of meaningful environmental and labor standards, and currency manipulation, all of which are valid.

Less appreciated, however, are the other measures which China uses to game the system. The two most extreme of which are China's Indigenous Innovation Production Accreditation Program, about which you've heard much testimony in the past, and its unceasing demands that U.S. and other developed countries seeking to do business in China make massive transfers to it of their intellectual property, intellectual property that took decades to develop with internal investment and with the support from U.S. government-funded research laboratories.

These latter transfers, which are one of your major topics today, will because of their perpetual ripple effects throughout our economy ultimately in my opinion be an even bigger drain on our economy than the direct offshoring of millions of American jobs over the last 15 years.

A major example is the Boeing Company, whose CEO ironically runs the administration's Export Council. Using an initiative benignly called "systems integration mode of production," which entails providing its foreign suppliers and overseas subsidiaries with massive amounts of business knowledge, management practices, training and other intangible exports, Boeing has gone from producing nearly 100 percent of its commercial aircraft and parts in American to today producing only a small fraction of that work here.

The workhorse 727 airframe launched in 1963 had just a two percent foreign component; the 777 airframe launched in 1995 has about 30 percent foreign content. The new 787 Dreamliner, officially launching this year, will have nearly 70 percent of its manufacturing content coming from foreign sources.

In the year 2000, Boeing had 50,000 unionized workers in Seattle and Everett; 20,000 of those jobs have since verifiably moved to China.

The third faulty premise is that the United States can make up for the millions of manufacturing jobs being lost overseas with, to quote Larry Summers in June of 2009, "exports of software, movies, medicine, university degrees, management consulting and legal work," plus new employment by the high-technology companies of Silicon Valley.

This first conclusion is simply absurd on its face, and as for the high-

tech companies and their plans and capabilities, the best example of what is not happening concerns the company Apple, which the Obama administration often uses as its poster child for the second conclusion.

Despite $70 billion in annual revenues, Apple only has about 50,000 direct employees, 25,000 or so here in the U.S. and 25,000 overseas. What the administration and others seem, in my opinion, to purposely overlook are Apple's 250,000 indirect employees working at the company Foxconn, located out of Shenzhen, China, who are dedicated to manufacturing the Apple products sold here in the United States.

As an aside, Foxconn's total employment in China is a staggering one million workers. In other words, for every one of the 25,000 American workers now employed by Apple, mostly in marketing, administration and R&D, there are ten Foxconn workers in China who many of us believe should be American workers.

By ignoring the fact that Silicon Valley is mostly a jobs exporting juggernaut and not a jobs creating one, and the recent conclusion by its own BLS that U.S. employment in information technology will actually be lower in 2018 than it was as far back as 1998, in my opinion, the administration is playing into and not addressing the trend that now has half the revenue of the Standard & Poor's 500 largest publicly-traded companies coming from overseas, a trend that saw from 2002 to 2008 overseas employment by U.S. multinationals increase 23 percent while their employment here at home increased by less than five percent, in each case, heavily China driven.

In the face of these three flawed policies in our own thinking, and of China's policies and actions which are particularly counterproductive to our interests, we can either continue to try to resolve these issues through lengthy bilateral and internal discussions over the next several years, though this in my opinion seems a foolish course, or alternatively we can adopt a realistic, hard-headed approach to leveling the playing field.

Going forward, I believe it is imperative, imperative for economic, employment, competitiveness and national security reasons, that the administration and Congress first formulate and then implement a manufacturing and industrial policy for the U.S. that balances the mercantilist policies of our major trading partners, especially again China's, whose overall trade surplus in manufactured goods matches almost dollar for dollar our overall trade deficit in such goods.

Nineteen members of the G-20 have defined manufacturing and industrial policies. America alone does not. Yet no economy as large and complex as ours can prosper with less than 20 to 25 percent of its workers being in manufacturing and without the sector contributing a like percentage of GDP. Yet right now we have only eight to nine percent of Americans working in manufacturing, and the sector provides just 11.2 percent of our total GDP.

Second, we must demand that the U.S. government not enter into a bilateral investment treaty with China until China makes WTO compliant the Indigenous Innovation Production Accreditation Program.

Third, we must go after all of China's illegal subsidies, not just its currency manipulation. Many of these practices provide what's called a clear-cut countervailable subsidy, and they need to be treated as such, including China's abysmal environmental practices.

We need to put a halt to China's persistent theft of America's hard-gained valuable intellectual property. Right now the U.S. International Trade Commission estimates, as it did just last month, that up to 2.1 million new private sector jobs would be created in the U.S. in total if China would simply raise its IP protection to U.S. levels.

Finally, we need "buy domestic" and other domestic investment requirements for our federal procurement and for grants to our states and local governments.

Following the U.S.-China Strategic and Economic Dialogue meetings held here in Washington in mid-May 2011, Commerce Assistant Secretary Craig Allen declared, and I quote: "In all of these cases, indigenous innovation, intellectual property enforcement, transparency, we would have preferred much more explicit detail in terms of timeline, in terms of coverage, and in terms of implementation, but we are pleased at the same time that the Chinese did commit these previously verbal assurances in writing. That's progress."

Commissioners, that is not progress by any measure, and I for one will not be satisfied until we see genuine progress that is a more proactive stance to get Chinese leadership to modify their nationalistic economic policies.

Thank you very much.

[The statement follows:]

PREPARED STATEMENT OF MR. LEO HINDERY
CHAIRMAN OF THE US ECONOMY/SMART GLOBALIZATION INITIATIVE AT THE NEW AMERICA FOUNDATION
WASHINGTON, DC AND
MEMBER OR THE COUNCIL ON FOREIGN RELATIONS
NEW YORK, NEW YORK

Right now, three fundamental premises underpin America’s overall global economic and trade policy. All are faulty to one degree or another, especially as they relate to our overriding trade relationship with China and they all affect how the US pursues a largely misguided approach to economic relations with China.

1) The first premise is that advancing the interests of America’s multinational corporation always benefits American workers and in turn the American economy.

Ralph Gomory has today already addressed the often disconnect between big business interests and the best interests of the country which has largely removed employees and the nation from the responsibility mandate and left only shareholders and management. I concur wholeheartedly with Ralph and would only point out that in order to reconnect the two, we especially need to do away with the excessive corporate compensation which is driving U.S. business leadership into all kinds of selfish behaviors. For decades, CEO compensation as compared to average employee compensation was around 20 to 1 – now it is 400 to 1 with all the selfish behaviors which that has produced, most notably mindless outsourcing and a lack of acumen for looping together US R&D and innovation with production in the US.

2) <u>The second premise is that the rules-based, free trading system favored by the U.S., combined with the overall rule of country comparative advantage, will result in balanced globalization for all trading partners, especially to the advantage of American workers and the American economy.</u>

This premise works well when all nations play by the same rules. However, we know that China especially continues to pursue mercantilist policies that are at best anti-competitive and often illegal.

Much has been written about how China has gained unfair trade advantages through its abysmally low direct labor costs, lack of meaningful environmental and labor standards, and currency manipulation, all of which is valid. Less appreciated, however, are the other measures China uses to game the system, the two most extreme of which are China's "Indigenous Innovation Production Accreditation Program", about which you have heard much testimony, and its unceasing demands that U.S. and other developed countries seeking to do business in China make massive transfers to it of their intellectual property. These latter transfers, which is one of today's major topics, will, because of their significant ripple effects throughout our economy, ultimately be an even bigger 'drain' on our economy than the direct offshoring of millions of American jobs over the last 15 years.

A major example is the Boeing Company. Using an initiative benignly called "systems integration mode of production" which entails providing its foreign suppliers and overseas subsidiaries with massive amounts of business knowledge, management practices, training and other intangible exports, Boeing has gone from producing nearly 100% of its commercial aircraft and parts in America to today producing only a small fraction of that work here. The workhorse 727 airframe, launched in 1963, had just a 2% foreign content; the 777 airframe, launched in 1995, has about 30% foreign content; but the new 787 Dreamliner, officially launching this year, will have nearly 70% of its manufacturing content coming from foreign sources. In the year 2000, Boeing had 50,000 unionized workers in Seattle-Everett; 20,000 of those jobs have since moved to China.

3) <u>The third faulty premise is that the U.S. can make up for the millions of manufacturing jobs lost and still being lost overseas with, to quote Larry Summers in June 2009, exports of "software, movies, medicine, university degrees, management consulting and legal work" plus new employment by the "high technology" companies of Silicon Valley.</u>

This first conclusion is simply absurd on its face. And as for the high-tech companies and their plans and capabilities, the best example of what is *not happening* concerns the company Apple, which the Obama administration often uses to as the 'poster child' for the second conclusion.

Apple, despite its prominence, actually has only about 50,000 direct employees – 25,000 or so in the U.S. and 25,000 overseas. What the administration and others seem to purposely overlook are Apple's 250,000 *indirect* employees working at the company Foxconn, located outside of Shenzhen, China, dedicated to manufacturing Apple products sold in the U.S. (Foxconn's total employment in China is a staggering 1 million workers.) In other words, for every 1 of the 25,000 American workers now employed by Apple mostly in marketing,

administration and R&D, there are 10 Foxconn workers in China who could, and many of believe should, be American workers.

By ignoring the fact that Silicon Valley is mostly a jobs-*exporting* juggernaut and not a jobs-*creating* one and the recent conclusion by its own BLS that U.S. employment in "information technology" will actually be *lower* in 2018 than it was as far back as 1998, the administration is playing into, and not addressing, the trend that now has half of the revenue of the Standard & Poor's 500 largest publicly traded U.S. companies coming from overseas and saw, from 2002 to 2008, overseas employment by U.S. multinationals increase 23% while their employment here at home increased by less than 5%, in each case heavily China-driven.

In the face of these three flawed policies in our own thinking and of China's policies and actions which are particularly counterproductive to our interests, we can either continue to try to resolve these issues through lengthy bilateral and international discussions over the next several years, though this seems a foolish course. Or, alternatively, we can adopt a realistic, hard-headed approach to leveling the playing field; straightening out our trade deficit; helping U.S. companies be more competitive; and creating American jobs, especially manufacturing jobs.

Going forward, it is imperative – for economic, employment, competitiveness and national security reasons – that the administration and Congress:

1. Formulate and implement a Manufacturing & Industrial Policy for the U.S. that balances the mercantilist policies of our major trading partners, especially China's, whose overall trade surplus in manufactured goods matches almost dollar for dollar America's trade deficit in such goods. Nineteen members of the G-20 have defined Manufacturing Policies – America alone does not, even though no economy as large and complex as ours can prosper with less than 20-25% of its workers being in manufacturing and without the sector contributing a like percentage of GDP. As it is, less than 9% of Americans now work in manufacturing, and as a percent of our GDP, it is just 11.2% of the total.

2. Demand that the U.S. government not enter into a bilateral investment treaty with China until China makes WTO-compliant the Indigenous Innovation Production Accreditation Program, and in the interim, demand that the United States Trade Representative bring a Section 301 case against the Program. Because China is still not a member of the WTO Government Procurement Code, a Section 301 action is the only remedy currently available.

3. Go after all of China's illegal subsidies, not just its currency manipulation. Many of China's practices provide its companies with a clear-cut "counteravailable subsidy" and they need to be treated as such, including China's abysmal environmental practices.

4. Put a halt to China's persistent theft of America's hard-gained, valuable intellectual property which zaps our economy almost as much as China's adverse currency manipulation. The U.S. International Trade Commission (ITC) estimated last month that "up to 2.1 million new direct private-sector jobs would be created in the U.S. in total if China raised its IP protection to U.S. levels." The best solution in the short-term to this theft would be to adopt Senator Slade Gorton's recommendation last month to this Commission that the U.S. impose tariffs which would generate revenues equivalent to 150% of the estimated annual IP losses suffered by American companies in China.

5. Establish buy-domestic and other domestic investment requirements for federal procurement and for grants to states and local governments to the fullest extent allowed under our various trade agreements and the WTO.

Following the US-China Strategic and Economic Dialogue meetings held in mid-May 2011, Commerce Deputy Assistant Secretary Craig Allen declared, and I quote: *"In all of these cases – indigenous innovation, intellectual property enforcement, transparency – we would have preferred much more explicit detail in terms of timeline, in terms of coverage, and in terms of implementation. But we are pleased at the same time that the Chinese did commit those previously verbal assurances in writing. That is progress."*

This may be deemed *"progress"* by U.S. government officials but I, for one, am not satisfied that this is the kind of progress that we should be seeking or be satisfied with. We need to take a much more pro-active stance to get the Chinese leadership to modify their nationalistic economic policies and mercantilist practices.

HEARING CO-CHAIR MULLOY: I want to thank all three of our witnesses for, one, their written testimony in which they put a lot of time and effort, and then for their very forceful statements that they've made here today.

And we'll start the round of questioning with Commissioner Dennis Shea.

PANEL III: Discussion, Questions, and Answers

COMMISSIONER SHEA: Yes. Thank you for being here.

Very interesting testimony. Different views expressed. I have two questions. First, one for the two wingmen, one for Dr. Gomory and one for Mr. Hindery.

Dr. Gomory, you talk about how classic comparative advantage free trade theory doesn't work with respect to our relationship with China, and, first, you mention it assumes that both sides play by the same rules, and you rightly point out that we're not playing by the same rules.

But then you make this other point, which I found very interesting, and I'd like you to explain more about it. You say that the initial development of your trading partner is good for you, but as your trading partner moves from a less developed to a more developed state, things turn around. Then further development becomes harmful to your country. Its impact is to decrease your GDP, and you reference Paul Samuelson's work in a journal, which I do not read, called the Journal of Economic Perspectives.

And I was wondering if you could give us a little bit of a history lesson, if you could tell us where in history that point has borne out?

And, Mr. Hindery, my question for you is you say that the 250,000 Foxconn workers, many of them should be American workers, but I suspect that most of those Foxconn workers are making substantially below what an American worker working 40 hours a week at the minimum wage would work, and if you brought those jobs to the United States, the employees would have to be paid substantially more, and our iPhones would be more expensive and our iPads. And I was just wondering if you could explain that further, explain the point you made there further?

DR. GOMORY: There are two distinct things. One is the fact that your trading partner's improved productivity can be harmful to you has a long history of people knowing that. Professor Hicks in his inaugural address at Cambridge, some early writings of mine, but the notion that the further development, that it starts early and then turns bad is best expressed in the book that I wrote with Professor William Baumol in the year 2000 called Global Trade and Conflicting National Interests with some very good endorsements on the back of it from very prominent economists.

We used the standard model, the Ricardian model. I'm not down on the Ricardian model, but you have to use it properly and change the parameters when a country changes its abilities. And so you can run, so to speak, thousands of examples. Now you shortcut that with mathematics, and you can work out what all the thousands would show you.

So a careful analysis using the most standard model shows what I have said. So as a country changes and increases its productivity up near the technological limits, it can have a very negative impact on you, and it's hard to argue with the model.

COMMISSIONER SHEA: Maybe Dr. Levy would like to argue with it. I offer that opportunity if you--

DR. LEVY: Well, I appreciate that. Yeah, I'm argumentative. I think, you know, Paul Samuelson was truly a great economist, but that piece was not his greatest moment.

There's a very standard, it's a very, very standard model. In fact, it's such a standard model that it was what predicted that in the wake of World War II, you would have no trade really between the United States and Europe, between the developed countries, because everyone just trades according to comparative advantage, and when other countries become more like you, in fact, in that case, it was the U.S. becoming more like Europe, this comparative advantage disappears, you get a worsening of terms of trade, and you're worse off.

What we found, in fact, was that trade was more intricate than that, and that people could trade like goods. You could send autos back and forth across the ocean, and we found all sorts of gains from trade that we hadn't anticipated.

I found this particular article particularly strange because what it basically said was if China raises its standards and becomes more like us, we find that objectionable. So that's a very brief--I appreciate the opportunity.

COMMISSIONER SHEA: Well, maybe we can continue that if there's a second round because I'd love an argument between an economist and a mathematician. That's--

MR. HINDERY: You do not want that argument. Let me, Commissioner, maybe start from the bottom up because I think it will elaborate--when I get to the top--on Apple.

I start from the premise, and I think there's a lot of evidence that I'm correct, that no country as large and complex as ours can survive with eight or nine percent of women and men making something and the other 92 percent of workers doing something else.

I think it leads to a series of credit bubbles. There's a lot of evidence that the manufacturing percentage of a country as complex as ours, as large as ours, needs to be on the order of 20 to 25 percent. If you accept that premise, what we can't then do as a society is develop technology here which leads to manufacturing there.

And on the specific case of Apple, yes, the cost of labor in China is verifiably lower than it is here. Yet, in some work done by Microsoft in looking at the Apple scenarios, certainly not done by Apple itself, 90 percent of the cost differential between an iPod or iPad manufactured in Oregon would be something other than labor. Only ten percent would be a labor component.

Clearly, on the edge, there's going to be a bump as that higher wage impacts that iPad, iPod, but if 90 percent of the cost differential is not labor, if it's the illegal subsidies about which we've spoken in the past, then I think that puts that aside, but again you have to end up with a concurrence--I think you come to the concurrence that this society can't survive with only eight or nine percent of women and men making something.

The corollary percentages in Germany today, which we should model ourselves under because of its success in the recovery, are 25 and 28 percent manufacturing, respectively, and that model has to be what we drive to I think in the United States.

COMMISSIONER SHEA: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner Wessel.

COMMISSIONER WESSEL: Thank you, gentlemen, for being here.

The introduction was almost as long as your testimony because of the great things the three of you have done, and Dr. Levy, thank you for your government service and work with Strobe up at Yale, and other activities you've participated in.

Following on that question, and what has been a good portion of this panel, Dr. Levy, I'm reminded of the old saying: it works in practice, but will it work in theory?

And we're trying to apply Ricardo and other theories to apples and oranges. China is a nonmarket economy. We're trying to apply market theories as if we can jujitsu or jam them into that process when they don't operate according to market forces.

Some want to claim that they're moving in that direction, but the fact is they are a Communist country that is seeking through industrial policies

to advantage their people to the exclusion of legal norms. Whatever they can get away with, they will.

And let me say, I admire what they're doing for their people. They're trying to promote economic growth and the betterment of the people. My view is we and other nations need to do the same thing.

So if you could describe for me how we can take theory and apply it to these differential situations, and then if the other two witnesses could respond, I'd appreciate it.

DR. LEVY: Well, thank you. I appreciate the question. I think one conception of theory is that we make assumptions that everybody behaves in some idyllic fashion and then ask what happens? You can do that. It gets boring pretty quickly.

So then you start examining pathologies, and you say, well, what happens if people don't? What happens if, say, the government chooses to intervene and favor an industry? And you can look at a single intervention or you can look at a whole range of interventions, and so, which is also theory. It's also trying to think.

I think the only thing that theory really does is tries to make everything add up and make sure that you're not telling sort of partial stories that leave critical elements out. So it's not a novel thing for trade to think about what happens if the government gets involved and takes a more proactive stance and tries to back a national champion or tries to do something other than a free market prescription?

This has gotten a lot of people excited for a very long time. We had a great enthusiasm about strategic trade in the 1980s following the work of Brander and Spencer that led to big long empirical projects. This was not everyone ruminating on how wonderful the world is when we have laissez-faire. It was an eager exploration of do we have viable alternatives?

And what they found is things frequently go wrong, and so that I think does apply. It tells what to look for. It says where could we possibly see missteps if you do this? It doesn't guarantee that every step is a misstep. But it says what do we look for? What can be problems with this? What was it that made this potentially look like an inferior approach to a different approach?

So that's how I think theory applies, is it really is much more of an explanation both of the pathologies and of the healthy cases.

COMMISSIONER WESSEL: Leo.

MR. HINDERY: Commissioner, may I answer be actually a question to Dr. Levy? I think that, I think verifiably, we know we're at eight to nine percent of workers in manufacturing. I think we got there mostly by illegal behaviors. Others may argue with that.

If we are, in fact, at eight to nine percent of employees in manufacturing, is that a sustainable circumstance for this country? Because

if it is, then the agitation that I feel, for one, and perhaps you, as well, Commissioner, is less germane.

I don't believe we can as an economy survive into the medium, let alone the long-term, with just eight or nine percent. Do you agree or disagree, Dr. Levy?

DR. LEVY: Thank you.

I assume I'm allowed to answer.

COMMISSIONER WESSEL: Please.

DR. LEVY: I guess I don't have in mind a long-term number for what that ought to be. I will say this, what we have seen in manufacturing is a steady decline as a share of employment, dating back to 1979. This long predates China's emergence. China was still a very insular, poor place when this started.

Those who have studied this carefully have found this has probably much more to do with technological change, that we've seen nothing like the decline in total U.S. manufacturing output that we've seen in employment, that we've seen a dramatic increase in productivity, and we've had what has been a very problematic mismatch in skills between American workers and manufacturing employers, and I find that very troubling.

I think it's a real issue we have to address. I don't think trade is the main culprit.

COMMISSIONER WESSEL: I could certainly have a long disagreement and argument, but that's not the purpose of this.

Dr. Gomory, your thoughts on this?

DR. GOMORY: Would you remind me at this point what the question was?

COMMISSIONER WESSEL: Mr. Hindery, I'll let you ask it again.

MR. HINDERY: Ralph, the query is can a country as complex as ours--

DR. GOMORY: Yes.

MR. HINDERY: --with your academic background, as well as Dr. Levy's, is eight to nine percent a sustainable level of manufacturing employment for this economy?

DR. GOMORY: Well, I don't really have an answer to that. So I won't say anything, but I do think, my concern, which is based just on a lot of experience--you've got to remember I spent 30 years with IBM, right--is that we're losing productive jobs. Manufacturing is one of the biggest ways to lose them because manufacturing is a very large part of international trade.

Every company that I know of, and I know quite a few, they're all moving this stuff overseas, and we're replacing them by much lesser productive jobs, and I'd like to say that the theory that Will Baumol and I have developed expects that, and the recent work of a very prominent Nobel Prize winner, Mike Spence, shows that from government statistics that that's what's happening.

We're moving from the more productive sectors into the less productive. Now what exactly the size of those has to be, I can't say, but that is the tendency.

COMMISSIONER WESSEL: Thank you.

And if there is a second round, Leo, I'd like to have some questions about the real unemployment issues relating to your percentage issues and how we might address that.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner Bartholomew.

COMMISSIONER BARTHOLOMEW: Thanks very much, and thank you, gentlemen, both for testifying today and for the intellectual heft that you bring to this debate.

I'm particularly pleased to see that we have two leaders in the business community who have taken on the mantle of these challenges because I think that there isn't enough of that, and so thank you for that.

I have a couple of things. I'll start with a comment, which is I don't feel anywhere near as wedded to Ricardo's Theorem as other people do. I think that when you look at the world the way it was when he came up with it and the world the way it is now, the sheer size of China's economy and the sheer speed with which both products and ideas can move, really are factors that need to be taken into account to see if it's even relevant.

In terms of my questions, a couple of them. Dr. Levy, you have essentially said that you don't believe that government intervention works in an industrial policy, but how would you apply that to China's success in the development of its green energy sector? This is a sector that the Chinese government chose to focus on, and indeed it's forging ahead. So how would you reconcile that?

DR. LEVY: I think the key is what we're going to use as a measure of success. If you're going to say that the measure of success is that they are now a player in green energy, and that they can sell these products, then I'll grant you your point, that they can do this.

If you're going to say they've gotten extraordinary returns by their investment, and they're going to remain a technological leader, and this going to really pay off for them in the long run, I don't think we have the evidence yet to say that.

COMMISSIONER BARTHOLOMEW: It's interesting, though, that when you look at, not the newest, 12th Five-Year Plan, but the last Five-Year Plan that the Chinese government did, the strategic sectors that it wanted to invest in were the very sectors that we have allowed to lapse in this country, the sectors that are creating this crisis for jobs, and again I wonder, they didn't just randomly pick those.

They believed that these were important sectors for the development of an economy. So you're sort of applying a test that again, works in theory,

but in practice and in the reality that's going on, I don't see it working. It feels to me like you're sort of saying, okay, well, they might have been successful in this, but because I want to say that I don't believe the government intervention in this sector is a good thing, I'm going to shift the measure by which we're measuring it.

DR. LEVY: Well, I'm sorry. That wasn't at all what I intended to say. What I meant to say, and maybe I'll just sort of give an example, if I want to be the low-priced seller of widgets-- the classic economics product--and--

COMMISSIONER BARTHOLOMEW: And law.

DR. LEVY: Okay. Very well--and suppose they cost $10 to produce, but I declare that I'm going to sell them for $5, I can be a roaring success. I'll sell them for five, and everyone else will sell them for ten. They still cost me ten; I'm still losing money at every sale.

If your measure of my success is how many sales do I have, I'll look like I'm very successful. If the measure is how much money am I making, then I'll look very unsuccessful. So it's not really shifting the goalposts; it's saying I don't buy the original metric, which was simply if you can sell something in the sector, you've succeeded.

COMMISSIONER BARTHOLOMEW: But what if you, taking your widget example, drive all of the rest of the world's widget producers out of business by your practices, and then you have a lock on the widget market, and in some cases, like tool and die--we'll move beyond widgets to tool and die--there's a lot of intellectual property that goes along with this. If people can no longer produce it, you've cornered the market, and you can drive what happens next.

DR. LEVY: Right. That's a very well-established example, commonly referred to as predatory pricing, where someone can do this.

It's not always that easy to do, and it hits on some of the things I mention in my testimony, which is you have to be able to capture this market and hold this market against any newcomer or new entrant, and the key to making it profitable is once you've grabbed the sector, then you hike up prices.

We haven't actually seen that. If you grab that sector, but then incipient pressure keeps you from hiking up prices, you haven't really achieved anything other than subsidize consumers around the world.

COMMISSIONER BARTHOLOMEW: Well, let's take this away from production and take it actually to commodities or resources. If you look at what the Chinese government is doing in grabbing the sector of rare earth minerals, it is providing both a trade advantage to itself that way, a trade disadvantage to everybody else who needs it, and it can essentially determine both the price at which those minerals, the rare earth minerals, are going to be used, and use that as a political tool, which we've seen it did with Japan.

I'm just not sure that it fits into the world as you're positing it.

DR. LEVY: I think that rare earth is the best example you could have possibly come up with on this. But one of the things that makes that a particularly cutting example is that it takes years, I understand, for anyone else to ramp up production of rare earths.

We're now seeing this. You're seeing sort of mining groups in the U.S. So China is able to take advantage for a time of this. I think they're going to do themselves long-term damage and cast themselves as a unreliable supplier where you're going to get a market reaction to that, but, yes, I'll completely grant you that point. It has to do with the particular features of that market because it does meet these criteria. It's very hard to ramp up production of these things in short order.

COMMISSIONER BARTHOLOMEW: And I would argue that if they're controlling it, it doesn't matter if they are a, quote-unquote, "unreliable supplier." That's all to their advantage and to the disadvantage of everybody else.

DR. LEVY: But had they been distrusted all along, then firms might have invested in having an alternative source of supply, and it's what you're seeing in a lot of products.

I was at a recent conference in China where someone from their textile and apparel industry was complaining that all the firms they were doing business with were adopting a "China Plus One" strategy, where they were getting a lot from China, but they wanted to have another source just in case.

And the more you prove yourself an unreliable supplier, the more someone is willing to effectively pay for insurance to guard against this.

COMMISSIONER BARTHOLOMEW: Right. Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

Co-Chair Commissioner Slane.

VICE CHAIRMAN SLANE: Thank you.

My personal feeling is that we cannot recover from this terrible economic crisis without creating millions and millions of sustainable decent-paying jobs.

The only way, in my opinion, that we can do that is to bring back manufacturing because manufacturing pays one-third to 50 percent more than service, and manufacturing has a huge multiplier effect.

And the only way manufacturing is going to come back is if the U.S. government incentivizes them to come back to the United States. Right now they are incentivized to leave, having the highest corporate income taxes in the world, we don't have a VAT tax, et cetera, et cetera.

I would be interested, starting with Mr. Hindery, do you share that feeling?

MR. HINDERY: Commissioner, I absolutely share it. In 2006, when we

saw the uncounted unemployment number rising, we commissioned and started several initiatives aimed at jobs, and we quickly realized that those initiatives had to be coupled with tax reform as well as trade reform. They run the three, hand in hand in hand.

I come back to the Commissioner's question, Commissioner Bartholomew's question, it absolutely works perfectly when the government intervenes. Just look at the accumulated foreign reserves of China. Look at the position that they have created in rare earths. Look at the positions of dominance they've created in green technologies and other technologies.

It works extremely well or 19 of the G-20 wouldn't have a manufacturing and industrial policy. We don't. We know it doesn't work very well because we can't live with these consequences. So I very much believe, as I've said in my writings, and I think we have the evidence to show it, Commissioner, that if we don't get back close to 20 to 25 percent of workers in manufacturing-- this overreliance on high tech, on the one hand, and small business, on the other, is a fallacy--we will fail.

And if you are honest about how jobs have evolved in the United States, small business arose only when there was a stable manufacturing base put under them.

My mother and many mothers of yours, I'm sure, up on the Commission, gave themselves home permanents. It was only when there was a stability of middle class incomes that you had beauty parlors and nail salons and pizza parlors and McDonald's and all of the things we think of as small business, which the President takes such pride in.

The only thing that matters to me is Flint, Michigan; Dayton, Ohio; and Buffalo, New York. If you don't reestablish the manufacturing base of this country roughly at the level of 20 to 25 percent of workers, and the most immediate way to do that is trade reform with China. Dollar for dollar our deficit in manufactured goods meets, minus $10 million, China’s surplus in manufactured goods. It's that precise.

You don't fix that, you don't fix jobs, and it would help greatly to fix taxes as well as with, say a VAT.

DR. LEVY: I think that the manufacturing sector is a very important sector and a very important employer. I don't think it's the only important sector. I completely agree that to encourage job creation, we need to get our economic policies right. That includes taxes; that includes regulatory policies. I would not put discriminatory investment policies high on that list; however, removing obstacles is certainly something worth considering.

DR. GOMORY: I think if we're going to see a shift from the very destructive policies which our global corporations are following, and which Leo has so well described, and I must say I've been a participant in many of this. I've seen it firsthand, and I tell you if you can move your manufacturing overseas, your wages go down, your profits go up. Okay.

And the jobs are not replaced in the U.S., and we see that, and it's going to continue unless there are government actions to make that unprofitable or else corporations change their orientation about profit.

VICE CHAIRMAN SLANE: I just have a few seconds here. How do we overcome the lobbying effort of the 500 largest corporations in the United States who are making a fortune under the existing system?

MR. HINDERY: The reason I'm so pessimistic, Commissioner, is I don't think you do until there's campaign finance reform. It's not 500 companies. It's ten at the Chamber, eight to ten in Big Pharma and health care, and roughly ten in financial services. Roughly 30 companies are the bulk, roughly 90 percent of the dollars that come in lobbying, and unless you give the middle class its own lobbying alternative, which can only accrue, in my opinion, from campaign finance reform, you're doomed.

It's really that bleak, in my opinion. I live in that world. I've watched those dollars go into the political system, and it's a tsunami.

VICE CHAIRMAN SLANE: And what's so discouraging is when you look at the decisions of the U.S. Supreme Court, Buckley v. Valeo, Citizens United, that campaign financing is free speech, without a constitutional amendment, how do you even manage it? I mean it just seems so daunting to me.

DR. GOMORY: Can I respond to that?

VICE CHAIRMAN SLANE: Please.

DR. GOMORY: Perhaps, you know, I have lived so long that I have seen the obvious is not what happens. Okay. You know, I remember the Germans were going to conquer the world. I may be the only person in the room who can remember that. And it sure looked that way--right--when France fell. Right.

Then the Russians, well, you know. There went China. One damn country after another went Communist. The Europeans were tottering on the brink. They had huge Communist parties. And that ideology had tremendous appeal. And somehow that didn't happen; right.

Japan was a somewhat different case because I saw it closer, and I could see that they were strong in one sector but not in the rest; okay. But in those sectors, they did succeed with all kinds of government intervention; right.

And now it would seem that if we are doomed to be controlled by endless campaign funds, and there's nothing we can do about it, that may not be what happens. I mean another extraordinary event, which defied all logic, was two at the same time, which is when Obama was elected from nowhere, and second, it didn't make much difference. I don't know which is more extraordinary; right.

So don't think the future is that foretellable. But I certainly would share Leo's pessimism about making something happen or at least my

pessimism is about making something happen in Washington. But I would remind folks that polls show that the American people suffering through this are not fools. They do not believe that trade is good for America, for example, although everyone in Washington believes that, and everything else is protectionism. Okay.

But I do think that it's more likely that change will come through pressure from below despite all the money spent to the contrary than start above, but I don't discount that, nor do I discount that all our reasoning and predicting, projecting about the future can also be totally wrong.

DR. LEVY: If I may make just a very quick response. I certainly share the concern about the degree of money in politics. I was an advisor to the McCain campaign in the last election, and we were outspent by multiples. So it is remarkable what large flows of funds can do.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner Peter Brookes.

COMMISSIONER BROOKES: Thank you.

Let me broach a related topic, if I might, and I open this up to the panel. What effect are these issues and challenges that we've been talking about, this last set of questioning aside, having on matters of national security for the United States? Things like the defense-industrial base, our ability to manufacture? What sort of effect is this having on those issues?

MR. HINDERY: You know, I think, Commissioner, we've written at length about the blue water navy of China. It's clearly moved its sphere of influence outside of the South China Sea into the globe--60 submarines, 225 surface vessels of capital capacity. That's what you do when you have $2.5 trillion sitting in the bank. You spend it, and you spend it on aircraft carriers, you spend it on submarines, ballistic submarines. They have more submarines than we do at this point in time, combination of nuke boats and diesel boats.

That's what you spend it on, and I think that if you're Japan, your reaction to that is you have to rearm yourself, and I think that's what we're seeing now in Japan to that effect. I think all of South Asia is skeptical about our ability as a nation to defend their interests. We see it in the Vietnam fight that's going on now on oil and natural gas resources in the China Sea.

That's what you do with it.

COMMISSIONER BROOKES: Dr. Levy, do you have any thoughts?

DR. LEVY: Well, I don't count myself as an expert on defense matters. From what I understand, it's quite clear that China has been making advances, but that the U.S. still retains a very substantial edge in its military capabilities, and that the U.S. exercises a great deal of care through programs like CFIUS to try and ensure that the sort of critical national security matters are dealt with quite carefully.

DR. GOMORY: I share your nonexpertise so I'll give you an outsider's view of this. I have enormous respect for our military where I served myself for three years. But I cannot understand how the Department of Defense imagines that it can procure vital parts, and that it does not have the ability to replenish whatever it starts a war with from within, and that it assumes that somehow the capability to produce domestically is not necessary to prosecute a war. I can't--and it depends who you're fighting obviously. If you're fighting the supplier, it's not going to work.

And so it baffles me as an outsider to see our dependence in our military on outside suppliers.

COMMISSIONER BROOKES: Does anyone have any specific concerns about the defense industrial base and the ability to produce advanced equipment?

DR. GOMORY: I would also have that. Yes, I mean you don't make--and this is more the things I was involved in--you don't make complicated weapons out of junk.

In a lot of technologies you want to be actually ahead of the market, and we were for a very long time. We certainly are losing that. I mean where is memory made? Where are the best microprocessors made? They're not made here. They may be designed here. I mean that's just--it's not something that an outsider can understand.

MR. HINDERY: Commissioner, we can share with you, if you wish, there have been three incidents that have been of grave concern to our military around advanced chips in Taiwan, South Korea, and more recently in Japan. In each case, a natural disaster curtailed our ability to access certain chips that we need in equipment that we're using in both Afghanistan and Iraq. And if anybody wishes to see that, we have all that available.

DR. LEVY: I would just make the quick comment, if I may, which is that we, first, the U.S., actually, where we have been tilting this towards more advanced technology production is part of why the lower-skilled jobs have been disappearing and, second, to the extent that we undertake a more costly method of production to keep production here, that's going to make defense dollars buy less security sort of direct--you decide it's a worthwhile investment. But there is a cost to that.

COMMISSIONER BROOKES: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner Cleveland.

COMMISSIONER CLEVELAND: Thank you.

While I think campaign contributions and campaign finance reform exceed the mandate of this committee, as long as it's been raised, I would like to point out that it's not just corporations and their financial flow to political candidates. Unions have a huge role in this, and if that's in contention, ask former Senator Lincoln about her view of union funding in

political campaigns.

Dr. Levy, I liked your notion that capturing the market is not the measure of success. We talk often about long-term views, and the Chinese have a long-term strategy when it comes to economic growth, and the United States doesn't have one, and we'd like an industrial policy, and there are many, many shortcomings on our side.

So I think your notion that getting into the market and capturing it should not be the sole measure of success. I respect former Chairman Bartholomew's view that you can price your competition out of the market, and then there's a real question mark as to what happens next.

But I wonder if you would comment on the role that the Chinese government's political guidance has or how it would affect the likelihood of the sustainability of market dominance?

In other words, does their active engagement, not just in declaring national champions, but expectations and management of the process, affect whether or not it's likely that these companies, that may very well enter and price competition out of the market, are able to sustain their position?

DR. LEVY: I'm sure it does have an effect although it's not immediately obvious to me how it does. I think you could see pressures working in various directions, that to the extent you want to be, sort of remain as a leader, then raising prices poses a challenge because it kind of invites competition.

To the extent you want to recoup your costs, however, that is that incentive to push prices up.

COMMISSIONER CLEVELAND: I'm speaking more beyond pricing, more along the idea that the Chinese government often insists on reverse engineering an American product rather than coming up with its own innovation.

Do you see the potential for their approach to manufacturing as being detrimental to their long-term ability to sustain their market presence?

DR. LEVY: Yes, absolutely. I think one of the things we've seen in technology is that you get very limited life cycles of these products, and it was part of the point I was trying to make in terms of talking about you set a competitive environment to be a leader because you need to be not only mastering the current technology but moving ahead and getting that next technology, and you can't do that by repeatedly expropriating it from others.

COMMISSIONER CLEVELAND: That was the point I was hoping to get at. Could you also talk a little bit--I think it's in your prepared testimony, but we didn't discuss--about what role you see for the WTO and the GPA in terms of management of these issues in the future?

And I would welcome Dr. Gomory and Mr. Hindery's views on the WTO

process and GPA as well.

DR. LEVY: I think--this is an excellent question--I think China made very substantial commitments to the WTO when it acceded in 2001. It has done a reasonably good job of carrying out those commitments, but those commitments were limited.

Among the things that it did not sign up for was the Agreement on Government Procurement, and that was a significant omission. It has put forward some proposals for doing this, which have been deemed, I think rightly so, insufficient. I haven't explored the details, but I find the arguments made by the U.S. Trade Rep's Office perfectly credible along these lines.

And I think this is an important avenue on which the U.S. government should push and say these are some of the norms of proper international economic behavior, and especially for a country with such a substantial state sector, it's very important that it follow these rules and move towards an open government procurement process.

COMMISSIONER CLEVELAND: Are you optimistic that the WTO is able to bring that about?

DR. LEVY: Well, I don't think it's the WTO that brings things about. I think it's its members, and the WTO is in a difficult state at the moment. So to the extent that it was previously able to flex muscles, it's a bit enfeebled right now. So I think some of this is which fora the U.S. puts forward and emphasizes as the right place to focus these efforts.

And I think it's very important to realize in a whole range of the discussions we have about Chinese practices that they may be practices that we think should be against the rules, but we haven't always agreed to those rules yet. And so it's very important that that be a priority to go out and get international agreement and to get other nations to say this is proper behavior and these are transgressions.

COMMISSIONER CLEVELAND: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

I was at a hearing last year at the Ways and Means Committee on the legislation to deal with China's underpriced currency. I think you testified, Mr. Hindery.

Professor Aliber of the University of Chicago couldn't be there, but he submitted testimony, which I then read. On page four of that testimony, he says that the trade deficits and the outsourcing of jobs are related very much to the fact that we're now running budget deficits because we're outsourcing the wealth-producing part of our economy; therefore, we don't get the tax revenue that we would have got if we hadn't gone down that road.

It's on page four of that testimony, and I would recommend people read that because I think it's very relevant to the debate we're now having

about the budget in Washington.

But the question I really want to get into with the witnesses is this, I was on the Senate Banking staff back in the beginning in '83, and corporations, they used to have something called the stakeholder view, that their responsibilities were to communities, their workers, their shareholders, the nation.

And I remember there was the rise of some of these corporate raiders, institutional investors, and all that sort of thing, and that began to change, and I remember the Business Roundtable coming in and lobbying, saying if we go down this road of just focusing solely on shareholders, it's going to be a problem.

We tried to develop some legislation to deal with that. We never could get it dealt with. Is it your recollection, Mr. Hindery and Dr. Gomory, that something morphed in our own system where we used to have a stakeholder vision of corporate responsibility, and now we have a shareholder, and any thoughts about how that happened and what we can do to reengage the system and what corporations are supposed to be doing?

MR. HINDERY: The Chief Executive of the General Electric Company before Mr. Immelt and actually before Jack Welch was Reginald Jones, who at his behest the Business Roundtable actually formally adopted the multiple stakeholder perspective. His inaugural speech as chief executive here in Washington at the Press Club was that he now had multiple responsibilities equally to shareholders, to employees, to the nation, to his communities, and to his customers. He listed five.

After Enron, after WorldCom, et cetera, the same Business Roundtable abandoned that in a similar formal vote and used only shareholders, and I think where it fell apart, as I briefly said in my testimony, Commissioner, is compensation. I think that when compensation jumped from on average 20, 25 to one, for the CEO versus his average employee to hundreds of times what his or her average employee makes, I think that the path became slippery.

And I think it's that instance. I think it was trickle down under David Stockman that put all of this at risk, and I think you can prove it. I mean there's a lot of papers and thought on it. I did a book on Reginald Jones on this issue, and it comes down to that. If you don't have a sense of the nation as part of your responsibility portfolio, you act the way they've been acting.

And what I come back to, to Commissioner Slane's comment, I don't know where the lobbying force is to bring that back. I know where anger is, but I don't see how that turns into political behaviors and actions that we can take to the bank, so to speak.

HEARING CO-CHAIR MULLOY: Dr. Gomory, do you have any view of that shareholder value issue, and then, Dr. Levy, if you have any thoughts?

DR. GOMORY: I completely agree with what Leo is saying. I'm just going to say it again, my own words, because I lived through the transition; And before, during the stakeholder period, it was quite a different world, and in IBM, we felt a sense of loyalty to the company, and they were loyal to us also. Loyalty has to be two way. So we worked at things like having good products.

We didn't know what the share price was. We were just trying to do good things. And it worked. We created really good stuff over and over again. And that's not the way it is now, and what changed is exactly what Leo said.

If you're a CEO, you know, in that earlier epoch, you are with your people every day. You know what their concerns are and you are dominated by those internal considerations and the fact that your product isn't selling, we got to make a better product, et cetera, et cetera, et cetera.

And the outside influence of the stock price on the board in those days was very remote. I mean these are folks who show up every few months. And it took an enormous shift in CEO compensation that tied it to the stock price. The thought process eventually changed. It took an enormous change in the compensation of CEOs to woo them away from their concerns about employees and community and country.

They didn't do that easily. They didn't do it for a ten percent increment. You heard the numbers that Leo gave, and that transition occurred because the shareholders wanted a bigger slice of the pie, and they got the whole pie.

DR. LEVY: Well, I obviously don't have the business experience of my fellow panelists, and given their distinguished records, I probably own substantially fewer shares of stock as well, but for those that I do own, I'm actually quite glad when the heads of the companies work on my behalf as a shareholder.

That does not preclude them establishing good relationships with their employees because that may be the way to maximize the value of the company. When it comes to doing sort of charitable work and working in the best interests of the nation, I guess I have my own views on the best way to direct those funds so I would rather they channel them through me, and then I can make those decisions.

HEARING CO-CHAIR MULLOY: Thank you.

We're going to have a second round. We're going to hold those to three minutes per Commissioner, and we'll start with Commissioner Wessel.

COMMISSIONER WESSEL: Thank you. We could have a corporate governance discussion for many, many days going back to the business judgment rule as well as performance-based pay, and stakeholder economics and many other things, all of which are interesting, but not within the purview, I think, of the Commission, although we'd be happy to revise our

mandate if anyone wants to join with me--not that Congress would go along.

Leo, I'd like to ask some questions to follow up on a lot of work that you've done, which is deeply appreciated, in terms of the real unemployment rate where you've dissected the numbers and recognized and highlighted the fact that the 9.1, 9.2 percent number only tells a small portion of the story.

You've spent also a lot of time on the Smart Globalization Project. Can you describe briefly the connection between trade and China, most specifically, and the employment situation now, as well as how people view the China situation?

MR. HINDERY: Some work we started to do back in 2006, and we've carried forward every month, tries to look, Commissioner, at real unemployment, which I think has been consistently now for almost five years double the official number. So if the official number is nine percent, I use 18 percent.

If it's 15 million women and men in total, I use 30 million, and that hasn't budged, in fact. Since the Inauguration, the number of women and men in real unemployment terms has risen 4.8 million. So we're not topping this off by any stretch. The reason I focus on it is because if I have a 15 million worker problem, I react one way. If I have a 30 million worker problem, I must react another.

It's a further imperative why manufacturing is so important to me. Commissioner Slane spoke of multiplier effects. Just the economics of putting those women and men back to work would fix this economy.

I'll give you an example. The Milken Institute has looked at the state of California and its budget crisis. If it had a percent of employment in manufacturing similar to what it had 12 years ago, just 12 years ago, there would be no deficit in the state of California. It's that simple.

So all you have to do is get back to manufacturing levels with which we were comfortable for decades, and you solve most budget problems, state, local and federal.

As for the issue of anger, I would call your attention to some work that Pew has done recently, that offers me some optimism, albeit just a little. Pew found that the anger is not just at trade policies, Commissioner Wessel, it's at China specifically.

I think there's a general sense of cheating going on. I think for too long we have blamed the American worker for being overpaid, uneducated. I promise you in the 28 million women and men now who would seek employment tomorrow if I could provide it, there has to be enough educated women and men to fill the bucket. I mean it's just absurd to use this canard of we're undereducated and we make too much money.

I said to Commissioner Slane as well, 90 percent of the differential is not labor. Fix the 90 percent, and I'll take care of the ten percent. When we

say that these women and men are insufficiently educated, it's a fraud. It's one of the great corporate frauds on workers, is go educate yourself, and I'll be there for you, except in meantime, I, Jeff Immelt, will ship 14 jobs overseas during my stewardship for everyone I create here in the United States.

That's the man who runs the jobs council for this government. So I'm completely distressed by the real unemployment number. I don't find a solution outside of manufacturing.

COMMISSIONER WESSEL: Thank you.

HEARING CO-CHAIR MULLOY: Commissioner Shea.

COMMISSIONER SHEA: The International Trade Commission released a report recently that indicated that Chinese IP theft results in approximately, if I get my numbers right, $48 billion a year in lost revenue for U.S. companies, and--it seemed like a staggering number to me-- 900,000 plus lost American jobs.

MR. HINDERY: It's actually 2.1 million jobs, that same report, Commissioner.

COMMISSIONER SHEA: Okay. 2.1. Thank you for correcting me. So that's a lot. One, I was wondering if you had seen the report, what your thoughts were, and, two, what should we do about it?

Earlier today, we had one witness, and I've heard this said numerous times over the years, that we need to convince the Chinese to behave in a certain way because it's in their own self-interests. I happen to believe the Chinese have a very good ability to figure out what's in their own self-interests, and they don't need us to tell them what's in their self-interests.

But what should the response--we've been talking about IP theft from China for years, $48 billion, 2.1 million--what should be the response?

DR. GOMORY: I really concur. I'm mystified honestly by the notion that we're going to tell the Chinese how to behave. Honestly, if I were in China at this point or if I was Chinese leadership, I would be saying something like this: those countries cut us up so we didn't participate early in the technological revolution. So they sewed everything up, and now they want us to pay for what they did to us.

That's the way I would look at IP, and I've talked to enough people from emerging economies that they don't share our view about the sacredness of IP. As a sovereign nation, I'd find 100 ways to steal IP. And I just don't think that that can be controlled.

I think this is a fact of life. It's a sovereign country. It has its own history; it has its own directions; it's going to steal the stuff. And if you don't want it stolen, don't go there.

COMMISSIONER SHEA: Okay. Dr. Levy and Mr. Hindery.

DR. LEVY: Thank you.

Yes, I am familiar with the ITC study. I helped work with some of the

economists on that. They faced some real severe obstacles because they didn't have existing studies. It was hard to do this. They ended up doing surveys of businesses and asked them to guess what this would cost, probably the best they could do, but it makes for very, very uncertain numbers, and it's generally not a reliable way to get this. I think they were in a difficult position.

I think in terms of what to do with this, you're right, we have been mentioning intellectual property for years, but we haven't necessarily been prioritizing this. If you want to talk about what our priority has been, it's generally been currency, and you get a certain number, you only get one thing that you can make a top priority when you're having negotiations of this sort, and I think we've followed a misguided approach for several years.

I think you saw the Obama administration switch that approach starting in January with the summit with President Hu, and I think that they've achieved results by doing so, that you got some commitments. We have to look very carefully to see whether there's a follow-through on those commitments, on things like indigenous innovation, which you've already seen the USTR announce recently on wind energy subsidies, that there seems to be some movement.

So it remains to be seen how well this would work, but it's a far more promising approach than banging our shoe on the table with currency, I believe, and I think also the earlier discussion we had about pushing things through WTO and international rules is going to be fruitful.

COMMISSIONER SHEA: Okay. Mr. Hindery.

MR. HINDERY: Commissioner, I'd simply recall Senator Slade Gorton's testimony here. Theft, by definition, is theft.

It's intolerable. We don't stop every bank robber, but we sure try, and I think that Senator Gorton laid out a pathway, albeit one that’s a bit problematic on the edge. He proposed tariffs, 150 percent of the proven IP theft, and more power to him. I think it's a great solution. I previously referenced it in earlier testimony to this Commission.

I don't know any other quick solution. I think the WTO process is so protracted and so delayed that that's not the solution I'd seek.

COMMISSIONER SHEA: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

Commissioner Cleveland.

COMMISSIONER CLEVELAND: Mr. Hindery, I'm interested in the statistic that you used just a moment ago, that if California were able to increase by one percent its manufacturing--I'm not sure what follows the word "manufacturing" there--comparable to where it was 12 years ago. Is that what you said? Correct me if I'm wrong.

But the point was that if they increased what sounds like a--

MR. HINDERY: No, Commissioner, if I said that, I misspoke. If they

had the same percent of employees in manufacturing today as they did 12 years ago, the Milken Institute has concluded that there would be no state deficit.

COMMISSIONER CLEVELAND: Okay. And so if they had that same level as they did 12 years ago, what would they be doing?

MR. HINDERY: A good example would be those iPads and iPods that Commissioner Shea asked me about. They could, in my opinion, easily have been manufactured in California instead of shipped to Foxconn.

COMMISSIONER CLEVELAND: And--

MR. HINDERY: That's 250,000 workers at Foxconn that could have been in California, in my opinion.

COMMISSIONER CLEVELAND: And what would be the differential between the labor--ten percent versus 90 percent I think was the number you used. What would the cost be in wages for those jobs to be in California?

MR. HINDERY: Oh, they would be--

COMMISSIONER CLEVELAND: Relative to China?

MR. HINDERY: That wage would probably be of a Foxconn worker versus a California worker at that level, probably a 40 percent differential. Very severe. But relative to the price of the iPod and iPad, it's probably less than a dollar.

COMMISSIONER CLEVELAND: So I guess the conundrum for me is if indeed we need to get to a level of 20 to 25 percent of workers being in manufacturing, it's easy to say. I'm just not sure what it means and how we get there, and when you say implement a manufacturing and industrial policy comparable to China, do you actually think that we can implement a policy comparable to China in this country? And what would the elements look like?

MR. HINDERY: Commissioner, 19 of the G-20 have a very precise defined manufacturing policy. We take great pains to prove we don't. We don't have buy domestic/buy American provisions in any of our federal or state or local purchases except for what's called the "Militarily Critical Technologies List."

It's the only place that we have such a burden. We tried it in a de minimis way in the Stimulus bill. There are so many ways if you had a policy, you would change your taxes to mirror your policy, you would--

COMMISSIONER CLEVELAND: How?

MR. HINDERY: How?

COMMISSIONER CLEVELAND: Yes.

MR. HINDERY: Right now as a corporation, General Electric is incented to move a job overseas much more than they are incented to keep that job here. We know how to fix that. We've talked about VAT in front of this Commission and others. I've written about it. Others have as well.

If you had a policy, Commissioner, then everything is on the table. You've had women and men testify in front of this Commission from the small and medium-sized business community who say, notwithstanding the Stimulus package and the bailout, they can't borrow monies.

If you had a manufacturing and industrial policy, the small manufacturer would have had access to borrowing as a quid for the quo of the financial bailout. In my opinion, J.P. Morgan would have been compelled to lend to small and medium-sized businesses. They don't. That's what a policy means. It puts a patina, an umbrella over all kinds of solutions.

There is no magic silver bullet here, but we don't have a policy because Larry Summers said to this nation, on behalf of this administration, that a job is a job, that we can make up in films, in legal services and consulting services what we've lost in manufacturing.

It's just patently absurd to make that contention, and that's what drives me. A job is not a job.

COMMISSIONER CLEVELAND: Well, I think, again, the restructuring of the American domestic manufacturing or industrial policy is not something that this Commission is charged with formulating, but it's the realistic element of it that I'm most curious about, and I would--

MR. HINDERY: Commissioner, can I just add, if I might?

COMMISSIONER CLEVELAND: Yes.

MR. HINDERY: The purpose of this particular panel is the theft of intellectual property in large part. Yet this theft is of no consequence if you don't care about the consequence on manufacturing, since the current theft of intellectual property is largely manufacturers.

So if you're not concerned about manufacturing and the percent of manufacturing in the United States, it's of a little consequence to me that you should be concerned about IP theft. That's what it means. That's the Boeing Aircraft Company that has watched, as has Microsoft and others have watched, their technology be stolen--

COMMISSIONER CLEVELAND: Yes.

MR. HINDERY: --so that the next generation mid-range commercial aircraft in China will be 100 percent Chinese made. The 319, the Airbus 319, and the Boeing 737, by the year 2015, there will be none in China. They will all be Chinese made.

That's what the theft of IP property means to me.

COMMISSIONER CLEVELAND: Dr. Levy, do you have something you--

DR. LEVY: Well, I would just say that I'm not sure that that logically follows, that simply to say that we're reluctant to call for a government manufacturing strategy and to hold manufacturing in a special exalted status above all other sectors, if we are reluctant about that, that's not the same thing as saying, well, therefore we care nothing about manufacturing, and

theft is fine. You can say it is one important, very important, sector among several, and therefore we care quite a bit about theft occurring.

COMMISSIONER CLEVELAND: Thank you.

HEARING CO-CHAIR MULLOY: Co-Chairman Slane.

VICE CHAIRMAN SLANE: I have struggled for some time on how to balance our trade, and to me it's such a critical component of getting back to a viable economy, and I have concluded in my own mind that the only way we're going to do it is with tariffs, and that it is not only China, it is 90 countries that we have a deficit with, and I know I've spoken to Ralph about Warren Buffett's plan, but, in effect, it's a form of a tariff. So I would be interested in your reaction.

MR. HINDERY: Commissioner, I'm very much of an advocate. I think we are in an emergency state where we would be allowed to declare, to demand tariffs. I don't want to disavow the WTO. We are signatories to it, and I think we have to follow the agreements that we've entered into.

But they are slow acting. They're largely ineffective, and I think we've been forced into an emergency situation. I think the numbers that I shared with Commissioner Wessel as to the depth of the unemployment situation in real terms suggests we are way past an emergency situation. I would declare tariffs widely.

DR. GOMORY: I completely agree that tariffs are needed. I think the Buffett one is a particularly good one because it doesn't shut down trade. But basically it takes more than a one-shot thing, an emergency thing.

If you're a company, and you've just been wiped out, and now they put in a tariff, it's going to take awhile for you to decide you want to go back in there, and if it's an emergency measure, and there's no overarching industrial plan that we're going to preserve manufacturing, for example, if you're a manufacturer, you're not going to do it because, you know, next year it's over. Three years from now I'm investing, I'm building up my capabilities that were destroyed, and I'm supposed to do this behind a one-shot thing? No.

If we don't have tariffs in a form that are part of an announced plan, an announced goal and determination to preserve things in this country, it will be very hard to restart. I don't think people will make that decision.

DR. LEVY: With all respect, I couldn't disagree more strongly. I think, first, we can note that trade balance does not equate necessarily with jobs. We saw the trade balance improve over the last several years as the job situation worsened significantly, which kind of belies any simple equation between the two.

I think, I understand the great temptation to model oneself on the Nixon administration in 1971 where they did apply some tariffs, but at that time, they actually had room to do so within their GATT commitments. That does not exist now. I think that maybe oil--I asked the ITC at one point--oil,

there's a few oil categories where we're not at our tariff limits, but that's it, and I'm not sure you're actually suggesting that we try to raise the price of gasoline for American consumers.

If you wanted to find a way to provoke a global crisis in the economic system or to restoke the fires that we had lit so recently, I'm not sure there would be any better way to do it.

As to the Buffett plan, which I understand to be a matching of exports against imports, this is not an entirely novel idea. It was follies like this which kept the IMF in business in its nascency as countries tried to do these things and managed to mess up their economic systems.

VICE CHAIRMAN SLANE: Thank you.

HEARING CO-CHAIR MULLOY: Thank you.

I have one final question and a comment. During this hearing today, we've heard a lot about part of the problem of how these tech transfers are taking place and job transfers between us and China. Many witnesses have talked about the divergence between corporate interests and the national interests.

I just want to remind people that the Congress asked us to look at the quantitative nature of the transfer of U.S. production activities to the People's Republic of China, including the relocation of high technology manufacturing and research and development facilities, the impact of such transfers on the United States national security, the adequacy of U.S. export control laws, and the effect of such transfers on United States economic security and employment.

Without debating other Commissioners here today, but it seems to me that if there are things that have morphed in our corporate structure in a way we incentivize the system, and they're helping bring this process of relocating our industrial base to China, there are certainly things that the Congress wants us to consider and make recommendations on.

So I would just ask you this, Mr. Hindery, if you had to make one key recommendation from this Commission to the Congress to deal with this issue, what would it be? And then Dr. Levy and then Dr. Gomory, and then we'll conclude the hearing.

MR. HINDERY: Commissioner, I would simply follow the British model of letting shareholders opine on top level compensation. It's not binding, but it has brought great discipline to compensation in the United Kingdom since it was adopted. You don't steal the prerogative of the board on compensation, but they know that they're subject to the oversight of their shareholders, and again it's worked extremely well.

There are other shareholder governance issues attendant to that, but primarily you simply bring to the shareholders at the annual meeting the top level compensation, and they opine on the fairness and the appropriateness of it.

Since most of the shares in this country are institutionally held, it's an informed audience that opines. It's not a place where you take out your anger. You take out your wisdom, I think.

DR. LEVY: Well, my recommendation would be to commend Chairman Camp and Subcommittee Chairman Brady on their emphasis on these issues like indigenous innovation and intellectual property protection in place of some of the previous approaches which I think were unduly focused on currency.

HEARING CO-CHAIR MULLOY: Thank you.

Dr. Gomory.

DR. GOMORY: I would recommend that we announce a long-term policy to realign the motivation that presently exists for corporations to move the fruits of the R&D, which are manufacturing largely, but there can be others, out of the country. I proposed one instance of that, but it should be part of a larger program across the board. Manufacturing would be a large part of it, but anyone else that qualified should be in it, too.

HEARING CO-CHAIR MULLOY: I want to thank you very much--the witnesses here today, and I want to thank my fellow Commissioners for their thoughtful questions.

I think we've had a very good hearing, and it could not have been done without you witnesses. So thank you so much for being here.

I want to salute one of the members of our staff, Mr. Joe Casey, who played such a big part in getting this hearing prepared. Thank you.

[Whereupon, at 3:30 p.m., the hearing was adjourned.]

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ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

A study on "Indigenous Innovation and Globalization: The Challenge for China's Standardization Strategy" by Dr. Dieter Ernst can be found at: http://www.eastwestcenter.org/fileadmin/stored/pdfs/ErnstIndigenousInnovation.pdf