China's Industrial Policies:

The Impact on U.S. Companies, Workers and the American Economy

Testimony of

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The invitation to this hearing listed ten specific questions which I will attempt to address in the context of the work that I and our firm has done to date:

There is no single, permanent definition in China of a "pillar industry." Beijing municipal authorities announced in 2008 that for it tourism would be a pillar industry in the post-Olympics period. The same for Xinjiang. Coal mining is Shanxi's pillar industry. Automobile manufacturing is said to be the pillar industry for the Chinese economy. Also biotechnology. For Chongqing, information technology. For Nanchang, the semiconductor industry. But also pillar industries for all or part of China are variously: petrochemicals, non-ferrous metals, insurance, telecommunications, banking, wholesale, and utilities. So to some extent, being a "pillar industry" is synonymous with being "important enough to be supported by central, provincial or local government policy".

As the focus at this Hearing is the impact on United States industries and workforce of China's supportive policies, a more relevant class of China's pillar industries for today's discussion are those that are now or will in the future offer competition to American industries. Aside from automobiles, which are likely to arrive on these shores from China in the not terribly distant future in large numbers as they did from Japan and Korea, I would turn to the Medium and Long Term Science and Technology Plan of the Ministry of Science and Technology (MOST) for guidance as to areas of primary interest. A key aspect of the Medium and Long Term S & T Plan it to make intensive investments in “strategic products".

Under China's S&T Plan, key projects cover a number of priority sectors:

- core electronic components,
- high-end general chips and basic software;
- the technology for manufacturing extremely large integrated circuits;
- new-generation broadband wireless mobile telecommunications;
- high-end numerical controlled machine tools and basic manufacturing technology;
- development of large oil and gas fields;
- large nuclear power plants with advanced pressurized water reactor, high-temperature gas-cooled reactors;
- control and treatment of pollution in water bodies;
- nurturing new, genetically modified biological species;
- development of important new drugs;
- control and treatment of major contagious diseases such as AIDS and viral hepatitis;
- large aircraft; high-resolution earth observing system;
- manned space flights; and
- lunar exploration projects.

Detailed, elaborate papers address the policies which are believed to be necessary to achieve the project goals. Over ninety-nine of these papers have been planned, called "Guiding Opinions". A sampling indicates the breadth of their coverage:

- Accelerating Creation of Independent, 'Well-known' Chinese Brands;
- Supporting Technology Innovation of Small and Medium-sized Enterprises;
- Issuance of Corporate Bonds for Qualified High-Tech Enterprises;
- Regulation on Management of Start-up Investment Funds and Debt Financing ability of Start-ups;
- Suggestions on Establishing and Improving Regional Intellectual Property;
- Standardizing Foreign Acquisition of Key Chinese Enterprises in the Equipment Manufacturing Industry;
- Building Research-orientated Universities;
- Promoting the Development of State Supported High and New Technology Industry Development Zones;
- Establishing Guidelines and Funding for Venture Capital Investment;
- Creating Tax Policies Supporting the Development of Start-Ups; and
- Establishing 'Green Channels' for High-level Talents Who Have Studied Abroad to Return to China.

The comprehensiveness of these papers is remarkable by any measure. They are designed to at least equal the results achieved by more evolved market economies that have had a head start of decades and in some cases of over a century. This requires China to acquire a financial, educational and legal infrastructure in record time to support an economy whose growth is to be based on innovation.

How much intervention and of what kind?

I don't care if it's a white cat or a black cat.
It's a good cat so long as it catches mice.
Deng Xiaoping

A key question everywhere is what kind of state interventions best serve national interests and are deemed constructive by a country's trading partners. Globalization has put all nations into one world economy with fewer national barriers separating one trading partner from another. The origins of the current economic crisis stem in part from an excessive rate of savings in some countries, most prominently China, and in too high a propensity to borrow (and invest poorly) among other countries, most prominently, the United States. Global imbalances may have their roots in relative rates of savings, but combined with industrial policies, they have a differential impact on various sectors of each economy. Promotion of a given sector by one country will not in fact result in a win-win result as seen from the vantage point of those companies located in another country who are trying to compete in that same sector. (Ask Boeing about Airbus.)

Chinese government policies have a dual nature -- that is that there are promotional policies which are broadly considered to be acceptable by China's trading partners (white cat analogues) and other Chinese policies that are a matter of real concern (black cat analogues). About this latter category, a key question is whether the policies which harm others are in fact good for China. Another question is whether each black cat measure is consistent with China's WTO commitments, including those contained in its Protocol of Accession. In the category of black measures fall inadequate protection of intellectual property, national standards that act to insulate the Chinese market from the rest of the world, potential use of competition policy as an industrial policy tool, discriminatory government procurement, and subsidization that excessively distorts trade and investment patterns.

Taking the most recent past first, it is worth focusing on the much-praised series of Chinese stimulus packages. China has put into place a series of measures that appears to be intended to preserve, as governments wish to do, maximum benefits at home. China's Ministry of Industry and Information Technology (MIIT) currently plans to assist its electronics and information industries: electronics, telecommunications and Internet; via a number of key projects: integrated circuit, flat panel display, TD-SCDMA, digital TV, computer and next generation Internet, software and information service. According to reports, the measures to be used include direct state financial support, tax breaks, and measures to expand domestic demand. The Shanghai IC Industry Association is seeking additional investment from the government in IC companies. For the mobile phone and household electrical appliance industries, it is expected that there will be lower tax rates, additional subsidies, cash grants and increased state-bank lending.

Foreign industry concerns center on aspects of China's stimulus package that go beyond limited subsidies to encompass measures which limit competition: by emphasizing procurement by government and state-owned enterprises of products incorporating indigenous Chinese intellectual property, requirements for government purchases of software that is only interoperable with Chinese software, further emphasis on use and development of indigenous standards and use of exclusive information security standards. None of these concerns are new.

a. the drive toward indigenous innovation.

> *We must aim to be at the forefront of the world's S&T development, speed up the building of a national innovation system, and strengthen an original innovation capability." . . .*
>
> Hu Jintao

One of the chief driving forces of Chinese policy, aside from maintaining a strong growth rate annually for the sake of political stability and the welfare of its people, is the desire to build an independent technological base. For the last three decades, China relied heavily for its economic development on foreign direct investment, and still welcomes it with some limitations. Relying on foreign investment and imported technology has not been abandoned, but the emphasis has shifted, as noted in the National Development and Reform Commission's *11th Five Year Plan for Use of Foreign Investment:*

[We shall] encourage foreign enterprises -- especially large-scale multinationals -- to transfer the processing and manufacturing processes with higher technology levels and higher added value and research and development organizations to China, … to develop a technology spillover effect, and strengthen the independent innovation ability of Chinese enterprises. [emphasis supplied]

… [T]he overall strategic objective of use of foreign investment in China is to…change the emphasis in use of foreign investment from making up the shortage of capital and foreign exchange to introducing advanced technologies…

This emphasis is in turn captured and amplified in a wide variety of documents emanating from the various ministries:

> *Fundamental Principles: firstly, to combine the import of advanced technologies and the optimization of importing structure and raise the proportion of proprietary and patented technologies in product designing and manufacturing process;*

It says much about China's success in its economic development strategy that it can stress home-grown, that is, indigenous innovation. Some of the policies that foster innovation are positive ("white cat") and others are negative ("black cat"), that is, trade and investment distorting, and possibly WTO inconsistent.

b. Positive **(white cat) policies** –

1. Human capital and the S & T Workforce

China graduates each year nearly 600,000 engineers. Much is made of this phenomenal output of engineers, and other STEM graduates. And much should be. These are impressive numbers. It is true that studies by Duke, McKinsey, Cao and Simon, indicate China's educational system:

- is outdated, suffers from having a Marxist focused curriculum,
- emphasizes depth over breadth,
- has a quantitative over qualitative focus,
- does not nurture creativity
- leads to "transactional vs. dynamic engineers", and
- produces a shortage of "innovative" engineers.

But it cannot be concluded that of this vast population of annual graduates in engineering there is not a very talented top tier that is fully internationally competitive. Shocking evidence of this fact is seen in U.S. data showing that more than half Ph.D. candidates in engineering at present in U.S. universities are graduates from Chinese universities.

2. Science and Technology Parks

In creating S&T parks, China is emulating none other than the United States' experience. Menlo Park was the first research park, dating back to 1958, followed by Stanford Park,

Research Triangle in North Carolina and then Waltham, Massachusetts, each in the 1950s. It is hard to read that description of Research Triangle Park today without thinking also of Pudong. In 1988, Pudong was a large empty field across the Huangpu River from Shanghai. Today Pudong contains a High Tech Park and the Zhangjiang Life Science Cluster, the latter comprised of 25 square kilometers, seventeen of which are developed. As of 2005, there were 110 research and development institutions and 3600 companies in the technology park, with more than 140 of them foreign. The park's total output exceeds 11.122 billion yuan, up 190% from the previous year. The park employs 100,000.

China announced six years ago that it would build 100 national university science parks by the end of 2005. More than half that number appears to exist today. "The university-based science parks, by joining with local governments and companies, were playing a positive role in speeding up the industrialization of academic research results, and pushing forward reform of the school teaching and management systems" according to one Ministry of Education official. China's parks are said to average in area about 150% of the size of America's largest park, Research Triangle.

Zhongguancun Science Park in Beijing covers four times the area of the Pudong Zhangjiang Park, about 100 square kilometers, with some 400,000 professionals and support staff, and 6000 companies, with production of well over $14 billion yearly. It is heavily in IT, especially internet, and views itself as China's Silicon Valley. Suzhou Industrial Park developed in conjunction with the Government of Singapore, by the end of June 2008, attracted over3299 foreign enterprises, including 77 Fortune 500 MNCs with cumulative contractual foreign investment of USD 33.96 billion, and domestic companies with total contractual investment of RMB 129.57 billion.

The impact of China's science and technology parks on China's trading partners is hard to gauge. For one thing, foreign firms have a very substantial presence in the parks. Secondly, just as Mao was said to have replied when asked what he thought the impact of the French Revolution: "It is too early to tell." What may emerge could be a number of Chinese "pillar" biotech and other high tech industries.

3. Taxation

While tax schemes can easily cross into black categories, the simple, nonpreferential corporate tax rate in China is substantially lower than that of the United States: 25% v. 39%. Rob Atkinson of the Information Technology and Innovation Foundation, citing World Bank data, lists the effective corporate tax rates as China 15.7% and United States 32.0%. The U.S. effective corporate tax rate before all the specific advantages that China may accord a favored investment is just slightly over double the U.S. effective rate.

b. Distortive (black cat) policies

Having as a goal the promotion of a more innovative economy and series of industry is laudable. The promotion of indigenous technologies may be less trade and investment distorting, such as through science parks (again abstracting the idea of a park away from

that of a subsidy), but there are measures that can cross a line and give rise to claims of market closure.

1. Product standards and encryption

One of the clearest statements of the relationship between standards setting and achieving indigenous innovation was issued by the Shanghai Municipal Government in September 2004:

> - *[We shall] actively promote the formulation and implementation of technical standards with self-owned intellectual property rights and translate that technological advantage into a marketplace advantage to maximize the benefits of intellectual property rights.*

This kind of statement issued by a sub-national government is unique to China. Its meaning is clear, and it deserves to be taken seriously.

Further, as the State Council's Medium and Long Term Policy for Science and Technology notes:

> - *[We shall] actively take part in the formulation of international standards, and drive the transferring of domestic technological standards to international standards…*

Taken together, these statements are a reasonable indication of the central tenets of Chinese standards policies at the domestic and international levels. As articulated here, the Chinese government is not seeking technology neutrality, or market driven outcomes, either through its domestic standard-setting activities or through its participation in the establishment of international standards. It is seeking commercial advantage. WAPI (WLAN Authentication and Privacy Infrastructure) was an extreme example. Product standards work hand in had with "accreditation measures" to provide a protected market for products having independent innovation.

Since a substantial portion of leading edge procurement in China will occur under the auspices of the 16 key projects set out in the Medium and Long Term S & T plan, and much of the Chinese economy is state-owned, state-invested or otherwise highly state-influenced, which products are accredited may prove to be extraordinarily important in gaining or maintaining access to the Chinese market. It is worth mentioning in this connection that as part of its Protocol of Accession to the World Trade Organization, China pledged to have its state-owned enterprises procure only on a commercial basis.

An example of a seemingly coordinated approach that relies on standards setting, government procurement, and other policies, is the current Chinese government approach to encryption policy. Over the past year, various Chinese government agencies have issued new policies related to encryption technology and/or information security that will,

if implemented, have a potentially profound impact on foreign information technology (IT) companies seeking to do business in China.

What is best for China and various Chinese interests, commercial and otherwise? The point of departure should be that setting a standard should not drive innovation, rather: innovation (creating something unique and in demand in the market) should drive the setting of standards. Misguided standards policies can not only interfere with Chinese goals but can do great damage done to non-Chinese companies as well.

2. Information technology equipment

One study that our Trade Group produced looked at a major Chinese competitor that I will call "CTC". CTC frequently underpriced its U.S. and European competition by 50 percent. This could not be explained by natural cost advantages: Equipment and components were priced at world levels; labor-cost advantages exist but not to necessary degree to explain the differential; and capital costs would be expected to be higher than those of competitors, reflecting higher risk of new entrant.

CTC's profitability was not driven by parent-company operations. Indeed, profits had been reported to be higher than cash flow. Normally, income from operations is *less* than cash flow from operations. CTC's cash from operations could not explain the profits. We found that a significant portion of CTC's financing operations and profit sources occurred in its subsidiaries.

Part of the answer lay in Chinese government programs that promoted the Chinese information technology sub-sector through provision of R&D, favored procurement, provision of financing, requirements for local content, and other forms of assistance.

CTC was formed from elements of the People's Liberation Army. Important to its early viability was a very large contract from the PLA to provide services. In the early 1990s, the CTC continued to depend heavily on PLA contracts for both equipment and maintenance. Within a few years, non-PLA sales began to increase.

China's president pledged that:

> *The State shall become strongly involved [in the industry] to ensure its healthy development and make China's competitive product when turning to the outside world.*

In the mid-1990s: CTC began the practice of creating local joint ventures (LJVs) with local governments and local information technology entities. This is a pattern whose significance is not initially fully understood by its foreign competition.

China's Vice Premier of the State Council visits CTC, accompanied by the presidents of the four commercial banks, and hears of CTC's financing problems. Instructions follow. Merchants Bank "begins widespread cooperation" with CTC and introduces a novel

"buyers credit" program (perhaps not so different than Japan's financing the leasing of Japanese made computers nearly a generation earlier as Japan struggled to overcome foreign products' competitiveness in the Japanese market).

CTC named in 9th Five-Year Plan. Provincial and local government support for CTC is granted. In 1998, China Construction Bank provides increase in buyers' credit. In 1999, the Central government issues "encouragement guidelines" for service providers to source domestically. During this same period, the Central government begins the practice of directly assisting CTC win overseas contracts.

In 2000, China's 10th Five-Year Plan explicitly targets the principle equipment produced by CTC for "accelerated" development. It provides US$450 million to CTC in buyers' credits, and US$23 million for research. Within the next few years a Chinese government-owned "policy bank," provides CTC with a three-year *revolving* domestic buyers' credit.2000-03. Another "policy bank" provides CTC with US$145 million in long-term loans. 2001

In 2004, China's Ministry of Information Industries (MII) and the Ministry of Commerce (MOFCOM) "hammer out" a set of policies designed to encourage domestic IT and information technology firms to expand overseas. The same year a policy bank provides CTC with US$10 billion to "finance overseas expansion." Government officials state that a given percentage of equipment in China's next-generation systems must be locally produced. Chinese authorities "encourage" service providers to source from participants in science and technology development programs.

CTC presents itself as having no government ties. But the Central Government controls the service providers and the provincial governments control the projects for which procurement is required.

Now, let us revert to a peculiar set of corporate relationships that affect procurement in the Chinese market for CTC's products, and affect some third country procurement.

Each Provincial government forms a joint venture with the domestic Chinese competitor, CTC. The co-owned JV will bid for the provincial contract to supply goods and services. The purpose of this structure is described as follows: CTC has numerous local joint ventures to establish "communities with aligned interests" to "prevent the entrance of competitors by exclusion."

The joint venture receives cash in the form of investment by the provincial government and also revenues from the provincial project in which it is a successful bidder. The JV in turn provides a revenue stream to CTC, the joint venture partner. CTC did not have to rely exclusively on its revenues from selling equipment to the JV. This explains the mystery first cited in this section, profits being higher than revenue from sales of equipment.

In addition to the above, with respect to expanding sales in third country markets, the Chinese government purchases equipment from CTC to make donations to foreign developing countries. The Central government also provides, through government-controlled banks, buyers' credits to these foreign national information technology service provider customers. In some cases, the winning bidder in a third country transaction is a CTC JV partly owned by the foreign purchasing authority, replicating what takes place at home in China. In 2006, .a major Chinese policy bank provided an additional US$1.5 billion loan, the same institution that gave CTC the $10 billion buyer's credit previously.

It is clear that this state support alters the conditions of competition in world markets.

3. Oil country tubular goods[2].

> *The socialist system is better than the capitalist system in terms of fundamental political and economic systems, as public ownership is superior to private ownership … In 1999 China's steel output was 786 times that in the early years of the PRC … What did we rely on? We relied on the Party's leadership and the socialist system.*

OCTG include drill pipe used in exploration; tubing (the tubes through which oil and gas pass to the surface); and casing, the circular pipe which encloses and protects tubing and forms a structural retainer for the walls of an oil or gas well. OCTG are required to provide access to oil and gas deposits located in earth, rock and ocean environments. OCTG are of central importance to some degree of energy independence of China, the United States and Canada. As depletion rates have increased in Canada and the United States the amount of gas and oil found per foot drilled has declined. Most of the remaining oil and gas deposits in the United States and Canada now lie deep below the surface of the earth or ocean and can be accessed only through intensive use of OCTG, which are designed to perform in extreme environments. To offset high depletion rates, drill rig operators are drilling more wells and using more intensive drilling techniques. As a result a large portion of the total world market for OCTG is attributable to drilling activity in the United States and Canada.

Chinese government policies and measures created a large and expanding industry to produce OCTG. The government of China has placed a high priority on expanding the indigenous OCTG industry to eliminate imported products in its domestic market and to establish a major presence in export markets. China has already installed more production capacity for OCTG than it needs to meet its domestic needs, and additional projects to add capacity are under way.

Due to the state-backed expansion of OCTG capacity in China, Chinese production of OCTG has grown from under 1 million tons in 1999 to 5.5 million tons in 2006 -- the year-over-year growth rate in Chinese output between 2005 and 2006 was 53.8 percent. China already produces more OCTG than it consumes and will add an estimated 3.2 million metric tons of new OCTG capacity between 2007 and 2009 -- enough to supply 90 percent of the U.S. OCTG market at the 2006 apparent consumption level of 3.56 million metric tons. The result of Chinese production rapidly outpacing consumption has

been a large increase in Chinese net exports of OCTG. As recently as 2002 China was a net importer of over 230,000 metric tons of OCTG. By 2006 Chinese net exports were 849,000 metric tons, a change in net exports of OCTG of over 1 million metric tons in just four years. .

China has rapidly emerged as the principal exporter of OCTG to the United States, accounting for 54.7% of U.S. imports in 2008. China's share of the U.S. OCTG market tripled in two years, from 6.3 percent in 2004 to 19.3 percent in 2006, and Chinese export volume continued to increase throughout 2006 so that its share of the U.S. market in December 2006 stood at 30 percent. As existing known reserves of oil and natural gas in the United States are depleted, the energy sector must drill deeper and operate in more extreme environments to develop new sources of oil and gas. As a result, energy extraction efforts in the United States will become even more OCTG-intensive than they are today. If present trends continue, the prospect exists that the United States could become dependent on China to supply the basic equipment upon which its aspirations for energy independence are based.

The growth of China's steel industry, including the OCTG sub-sector, is entirely a reflection of decisions by central and regional government planners. Government organizations have defined objectives for establishment and expansion of specific steel enterprises pursuant to short, medium and long term plans for the economy. The enterprises tasked with carrying out these plans are themselves overwhelmingly state-owned entities. Government officials have marshaled the financial, technological and infrastructural resources to ensure that the plans have been carried out. Foreign steel producers have frequently provided technical and financial support, enabling China to create world class steel.

Financial support has been channeled to the steel industry primarily through the banking system, which is owned and controlled by the government of China. The government sets interest rates at levels that are lower than would exist in a market economy, giving rise to an excess demand for credit. Government officials direct the banks to channel their loans to enterprises and projects that are given priority in government plans. Because steelmaking projects have enjoyed such priority, financing has seldom proven an obstacle to industry expansion.

Many of China's steel mills would have faced difficulties surviving without repeated bailouts and infusions of government financial support. Billions of dollars of steel enterprises' debts have been written off to equity, taxes have been forgiven and new loans extended. Numerous so-called "debt-to-equity swaps" converted steel mill debts held by government banks into "equity" held by government asset management organizations. Because in most cases the government had an ownership interest of 100 percent in the mills prior to the swaps, its ownership interest did not increase in these firms.

The OCTG industry has benefited from all of the financial support measures applicable to the steel industry generally. With one exception, all of the major OCTG producers are state-owned enterprises. Outside of Tianjin Pipe Group Corporation, a stand-alone pipe

and tube producer specifically created by the government to end China's import dependency in pipe and tube products, all of China's principal OCTG producers are subsidiaries within steel industrial groups that have figured prominently in the five year plans of the central government and the five year plans of the governments of the regions in which they are located.

The Chinese steel industry reportedly has been shielded from many of the competitive pressures that normally confront privately-owned enterprises operating in a market economy and relying on market-based commercial financing. Prices have reportedly been stabilized through agreements among enterprises establishing output quotas and minimum prices. Compliance with such arrangements has reportedly been enforced by the government, which threatened to cut off bank loans to enterprises that do not adhere to price and output controls. In recent years China's OCTG producers have reportedly met periodically to stabilize market prices and "avoid vicious competition."

The steel industry has also been protected from external competition. The government of China has maintained the goal of replacing imported steel with domestic production since the mid-1980s and a succession of tax rebate measures has been implemented to create incentives for domestic users to favor domestic steel. Imports have been restricted through non-transparent administration of an import licensing system, the existence of which has been denied by the Chinese government. Imports have also reportedly been limited through government-to-government and industry-to-industry agreements establishing quantitative limits on Chinese steel imports. In the OCTG subsector, the government's efforts to replace imports with domestic production have been highly successful, with imports as a percent of domestic consumption plummeting from 82 percent in 1994 to 8 percent in 2006.

Protection of enterprises from competition almost inevitably leads to excess capacity, particularly when coupled with subsidized, low-risk financing. China's principal steel enterprises do not confront investment risks that face private firms operating in normally functioning markets. Rather, they have found that when they fall into a loss position and/or confront depressed prices, the state is likely to intervene to bail them out and to help them raise prices.

China's restraints on internal competition increase the risk of dumping in export markets. Given the sheer size of China's steel industry, the impact on international markets could be significant. China's steel exports have already begun to affect external markets, and China has in recent years agreed to limit its steel export volume to a number of major world markets, including the European Union and Korea. Chinese steel producers have also reportedly been asked by their Japanese counterparts to restrict export volume to Japan and have given assurances that Chinese steel "will not massively flow" into Japan. These measures could have a funneling effect on Chinese exports toward markets where such restrictions do not exist, such as the United States and Canada.

While dramatic expansion of China's OCTG capacity raises obvious concerns with competing foreign OCTG producers, it should also be raising concerns with Chinese

policymakers. Expansion on this scale, driven by government policy decisions, is not in China's long run interest for several basic reasons:

- Government-directed investment leads to major resource misallocation and acts as a drag on economic growth.
- The creation of large-scale overcapacity results in the establishment of trade barriers abroad.
- Domestic adjustment to overcapacity is a painful and potentially destabilizing process.
- Excessive investments in heavy industrial sectors exacerbate environmental problems.

Excessive investments in heavy industries, which tend to produce a higher proportion of local pollutants and greenhouse gasses than other sectors, place an unnecessary burden on the environment in the regions where the investments take place. This can ultimately spill over into domestic and international criticism

The competitive equation: The effect of China's policies

a. Policies to which objection is less likely to be taken.

Some government policies are unobjectionable – such as the promotion of STEM education. Others will raise questions about their consistency with China's international obligations. The impact of China's promotional policies will differ dramatically by sector, and each major industry sector deserves individual consideration. There are some bottom line judgments that can be made, however.

As one of China's goals is to enhance the international competitive position of many of its pillar industries by attracting both foreign investment and technology, it is useful to consider whether China is being successful in this regard through its use of financial incentives. Here the picture is mixed. While many foreign companies have research facilities in China, presumably many R&D facilities are end-product design centers which are placed in China to be close to the companies' manufacturing plants. These facilities are unlikely to generate core technologies.

It is difficult to track transfer of technology. Some transfers are no doubt negotiated as part of individual investment deals. Some is just follow the movement of engineers from jobs in foreign companies to jobs with indigenous Chinese companies. What one can track, through surveys, is the location of R&D expenditures by an industry. In a study recently completed by our International Trade Group for the Semiconductor Industry Association, we found through our survey of major U.S. semiconductor producers that the growth in U.S. company R&D outlays was almost negligible in China over the last several years. The primary growth in these expenditures was in Europe (thought to be primarily Central Europe) and in "rest of world", which in this case did not include China.

Even though the financial incentives were higher in China as a percent of R&D spending,

the survey found that "the perceived inadequacy of intellectual property protection in China has limited U.S. industry R&D spending in that country significantly." Direct cash benefits did not overcome other locational factors.

> *Most companies surveyed indicated that they would not locate their most advanced and critical R&D activities in China, despite encouragement and even pressure by the government to do so, and regardless of the availability quality and size of incentives, due to concerns about the inadequacy of intellectual property protection in that country. While intellectual property protection issues occasionally arise in other jurisdictions, industry respondents indicated that in general sufficient safeguards could be devised to permit certain R&D activities to take place. No jurisdiction other than China was identified as particularly problematic from this perspective.*

While most of the incentives in China consist of direct financial support, the tax treatment for R&D is favorable. The Dewey Semiconductor R&D study notes that:

> *Under China's law of taxation in effect in 2007, qualifying semiconductor manufacturers were entitled to receive a 5-year tax holiday with respect to corporate income tax beginning in the first year the business was profitable, and another 5 years of taxation at half the applicable rate pursuant to Several Policies to Encourage the Development of the Software and Integrated Circuit Industry (Circular 18, June 24, 2000). Although a new Enterprise Income Tax Law came into effect in 2008, that law provides a five-year transition period for businesses receiving preferential treatment under the old regime. In addition, the new law provides that firms qualifying as high-technology companies are entitled to a permanent reduced rate of 15 percent. In addition, qualifying semiconductor manufacturers are entitled to a full exemption from income tax for five years from the first year of positive accumulated earnings and a 50 percent reduction for the following five years under the new law. This combination of tax abatements has led Semiconductor Manufacturing International Corporation [not a U.S. company] which has been operating in China as its principal locus of operations since 2000 to disclose in 2007, "Our income tax obligations to date have been minimal."*

This favorable treatment for investors is on top of a general corporate tax rate that is, as noted previously, lower than that in the United States, and a rate that has been decreasing over time. Nevertheless, there is no significant allocation of the total U.S. semiconductor R&D being redirected to China.

There are a number of factors affecting the attractiveness of China as a destination for foreign direct investment. In overall ranking of countries in terms of global-based innovation competitiveness, the Atkinson Study (Information Technology & Innovation Foundation, February 2009) using a wide variety of measures – including higher education, number of researchers, amount spent of corporate and government R&D venture capital, broadband deployment, business climate, FDI, GDP/adult, etc.— places the United States 6th and China 33rd. But before complacency sets in among Americans,

the Atkinson Study also notes that China, of the 40 countries (including the EU) reviewed, moved its score up most over the last decade and that the United States least.

Of the various general measures of where investment should be located, among the most telling, the U.S. ranks 5th in business climate and China ranks 36th. This comports with our firm's study regarding location of American semiconductor R&D expenditures. Availability of talent is a factor: Atkinson looks at the percent of the workforce (adults age 25-34) with graduate degrees – 39% for the U.S., 9% in the case of China. This would be more compelling as an explanation were it not for the fact that China's population is 3.4 times that of the United States. So in fact the absolute numbers in the adult workforce with advanced degrees in the two countries could be about the same. In terms of availability of qualified workforce, the constraint in China may not necessarily be supply, although on this, the data is mixed. Atkinson notes that in 2006 the United States had 9.7 researchers per 1,000 employed, while China had only 1.5. (But the percent change for China for the period 1999-2006 was 111% while the gain for the United States was only 8%.)

With respect to semiconductors, as process R&D tends to be associated with place of production (this may well be true for other R&D-intensive industries as well), it is important to note that, overall, the share of worldwide wafer fabrication capacity in the United States has declined from 42 percent in 1980 to 16 percent in 2007, reflecting the growth of indigenous semiconductor industries in several Asian countries. China has increased its share of global production to about 8%, and the trend is clearly upward. Location of fabrication facilities is closely linked to available financial incentives. .

The Dewey & LeBoeuf study looked solely at U.S. semiconductor company placement of R&D, and while this may be a good proxy for foreign investment in China of R&D funds, it is not an indicator of Chinese company and government investment in R&D generally. According to the Atkinson Study, in terms of corporate investments in R&D as a percent of GDP, the U.S. outranked China -- 1.7% to 1.0%, but it should be noted that China had increased its corporate R&D by 160% during this period while the U.S. figure had dropped by 5%. Looking at government R&D as a percent of GDP (in 2006), Atkinson found the U.S ranked 4th at 0.76% with China in 19th place at 0.35% of GDP expended on R&D. But China had increased its expenditure ratio for R&D by 20% in the seven years covered by the study, while the U.S. increased its investment in R&D by only 1%. The bottom line is that China is improving its position relative to the United States by many measures, although the United States has a substantial lead at present.

The likely policy response to the above-outlined Chinese policies is to match them or exceed them, not to complain of them.

b. Policies of Concern.

Break the technological monopoly of developed countries . . . . Assist domestic enterprises in obtaining information on international technology market. . . . .[S]upport and encourage them to apply for domestic and overseas

*patents for re-innovated technologies; (*Issued by several ministries, Shang Fu Mao Fa [2006] No.13),

There is a fair amount of transparency in China, dramatically better than it was ten years ago. This allows one to get a sense of a number of policies that should be of concern not only to foreign competitors seeking to sell in China, invest in China or who will be or are competing with Chinese goods in third country markets. Some policy directions may well be harmful to Chinese development and China's goal of greatly increased "indigenous innovation" as well.

Among the policy tools that should be of greatest concern are:

- The creation of exclusionary standards that can wall off the Chinese market, creating national champions that are not internationally competitive, potentially diminishing China's rate of GDP growth if Betamax-style standards impair the degree to which IT, for example can contribute to the rate of GDP growth. To be enhance economic development, standards must be market-driven not market constraining.

- An intellectual property system that frightens off multinational companies from developing the latest technologies in labs based in China while risking ending up fostering what is many cases may be second-tier indigenous technological development.

- Potential use of the new antimonopoly law to protect domestic competitors rather than to enhance competition.

- Subsidies that excessively distort trade and investment. An example was the discriminatory VAT rebate for domestic manufacture of semiconductors which practice China terminated to be consistent with its WTO obligations.

- The temptation to force technology transfer which causes companies to shy away from placing the latest technologies in China. WAPI was one example.

- Buy-Chinese policies to attempt to foster "indigenous innovation", placing a bet that a more SOE-like form of industrial organization might work.

<u>The bottom line</u>

China policy makers have to a surprising degree opened its economy to foreign investment and market forces and this has led to an extraordinary level of economic growth. The central question going forward is whether China will opt for more state-planning in guiding investment and technology and whether this can be successful. The United States is sometimes aware that in its own history, when it had a national goal, the

manned-space flight program or the Manhattan project, for example, it could force the pace of technological development and that this has had major commercial effects as well. But the U.S. let the market direct the commercial outcomes. Early semiconductor development is attributed to government support, but it is the commercial market that is driving technology today and has done so for decades. China must find an appropriate balance. Walling itself off would prove not only contentious with its trading partners, on whose markets China must depend for prosperity and growth, but harm its continued development.

Much needs to be corrected about U.S. domestic policies in education and support for basic R&D. There will be areas where the United States should be watching what China is doing, and perhaps re-innovate (incrementally improve upon) what China has re-innovated of America's – and here I am thinking of research parks and emphasis on STEM education. There are other initiatives some of which are outlined above that bear watching for other reasons because United States commercial interests may be seriously adversely affected, as may Chinese economic development and growth.

The impact on the rest of the world of China's enormous effort to move forward on so many fronts will be hard to gauge until the policies have been in place for some time. As Mao was said to have replied when he was asked what he thought the impact of the French Revolution was, "It is too early to tell." It is not too early to tell what the impact is currently and is likely to be with respect to Chinese world market share of oil country tubular goods, for example. It may not be too speculative as to what the effects are going to be of Chinese automobile production, just as an extrapolation of U.S. experience with Japan and Korea (even accounting for numerous differences among those countries). What will happen with international competition in biotech, new energy products, software, other information technology products, large commercial aircraft and other areas of Chinese national priority? Much depends on the policies chosen by China and the responses chosen by the United States. Too little attention is being given by the U.S. government to these developments.

I have found on more than one occasion that there is more pluralism among Chinese ministries and other parts of the Chinese policymaking process than one would expect. A debate is possible in Beijing and in the provinces and municipalities between those seeking an autarkic path of development and those who still see an advantage in being a magnet for leading edge foreign investment and for more market-oriented solutions. It would be a profound error to be absent from that debate.

[1] This testimony is not intended to represent the views of Dewey & LeBoeuf or its clients.
[2] This section, on OCTG, is an edited version the work of Tom Howell and Bill Noellert of Dewey & LeBoeuf.

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