Chapter 11

Born Global:

The Impact of the WTO Process on China's ICT Competitiveness

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Introduction

On December 11, 2001, after fifteen years of negotiations, China became the 143rd member of the World Trade Organization (WTO). China's entry into the WTO will undoubtedly accelerate previous trends and diminish obstacles on the country's road to integration in the global information economy. But its entry will also contribute to the emergence of new conflicts, both internal (among sectors and priorities) and external (regarding "philosophical" or cultural issues, in particular). It is also likely that the implementation of WTO commitments will be accompanied by a strengthening, rather than by a diminution, of governmental involvement in technology; this especially concerns flows of information, development and transfer of technological know-how, and investment.

China has already begun to carve a distinct and new way of complying with WTO obligations. This may in turn feed new ways of thinking and operating within the WTO universe. In this interactive process it is likely that, among developing countries and economies in transition, China will be increasingly regarded as the intellectual and political leader of a progressive trend to strengthen the development and supportive aspects of trade liberalization and globalization.

The coming years will accentuate the importance and urgency of fundamental economic and social issues. For example, will China be able to move away from labor cost-based competitiveness? And will the WTO implementation process provide enough fresh opportunities to offset the negative effects on employment and social cohesion in certain key sectors?

Of all the sectors, the information and communication technology (ICT) sector is perhaps the one that will be most visibly transformed by these trends, and thus it offers excellent ground for viewing China's accession to a more important role on the global economic stage.

A Global Player

Because of the size of its domestic market, labor-cost advantage, and deep labor markets, China has rapidly emerged as a global player in the ICT field. This is true on both the supply and demand side of the ICT equation.

China's rise in the global ICT supply chain

China has become one of the world's most competitive sites for manufacturing numerous ICT products, from simple electronics and personal computers (PCs), to high-end mobile telephones and semiconductors wafers. Its rise has been driven by the confluence of a number of global and domestic trends, including (1) the commoditization of technology products; (2) the creation of transferable

manufacturing lines; and (3) China's own economic liberalization and opening, which enabled these trends to touch the mainland. As competition in those markets has increased, China's ability to compete on price, which is attributable to its deep labor markets, is lending it a clear advantage. High-tech products, which are manufactured mostly in and around coastal and southern cities in Jiangsu, Fujian, Shanghai, Guangdong, Tianjin, Qingdao and now, Beijing, comprise one of the fastest-growing sources of exports for China. Exports of high-tech products grew from US$7.6 billion in 1996, to more than US$37 billion in 2000 (United Nations Conference on Trade and Development [UNCTAD] 2002:161–162). At the same time, large cities of the hinterland, such as Chonqing, clearly the most dynamic city in the western provinces, have started to develop and implement ambitious ICT-related plans.[2]

In their search for lower-priced manufacturing sites, companies initially based in Japan or Taiwan helped to fuel the upscale and shift of Asia's technology and electronics supply chain to mainland China. In Dongguan city in Guangdong Province, more than 95 percent of computer parts are available locally and, with more than 2,800 companies focusing on computer and information technology (IT) products, including 800 from Taiwan investors, the city and its environs are currently the world's largest processing and export base for computer parts (ChinaOnline 2000a). Over the last five years, much of Taiwan's IT and electronics manufacturing has gradually shifted to mainland China, where more than 56 percent of Taiwan's motherboards, 88 percent of the its scanners, and 58 percent of its monitors are now manufactured (ChinaOnline 2000b). Another example is Toshiba, which has closed all of its television production lines in Japan and instead produces in China. Up to half of the US$1 trillion of manufacturing value in Japan has moved to mainland China in the past decade (Chan 2002).

An emerging global site for research and development

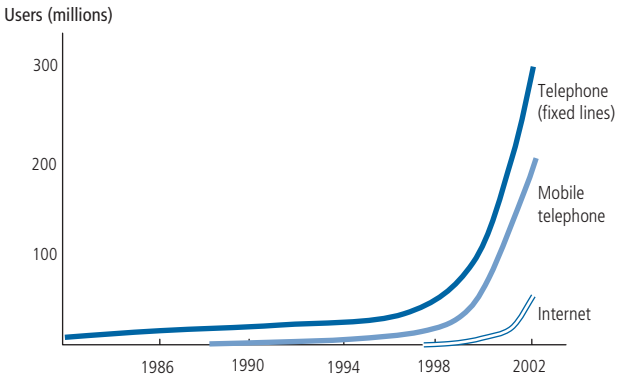
China has also slowly become a key global site for research and development (R&D) for global ICT companies. In 1997, only 13 percent of foreign-invested firms were applying their most advanced technology to their Chinese businesses; by 2001 this figure had increased to 41 percent (Lim 2002). Currently, about 100 centers for R&D have been established in China by global giants such as Motorola, General Electric, JVC, Microsoft, Oracle, Ericsson, Nokia, Panasonic, and Mitsubishi. Motorola, for example, has more than 650 research personnel and more than US$200 million invested in a research center in China. Microsoft has committed more than US$130 million to a research joint venture and to setting up one of its five global research centers in Shanghai (UNCTAD 2002:166). In 2002, Oracle unveiled a new software research facility in Shenzhen. This phenomenon of establishing is accompanied by China's own investment in the ICT sector, the largest in the Asia-Pacific region as a percentage of gross domestic product (GDP).

A new pole of demand for ICT products and services

The sharp downturn in ICT product demand in the United States and Europe and sustained high levels of growth of ICT on the mainland have meant that much of the current foreign direct investment (FDI) has been for local consumption. China is already the world's largest market for both fixed line telephones and mobile telephones.[3] In mid-2002, there were between 45 and 55 million Internet users in China. Although different organizations have produced different estimates, China is widely acknowledged to house one of the world's largest Internet-user market in the world, second only to the United States. Impressive as this may appear, this represents a rate of connection of only 3.6 percent of a population of 1.3 billion people, which is one of the lowest rates in the world.

Considering the rates at which China has been able to adopt new technologies in the recent past (see Figure 1), one can reasonably assume that the number of users will grow rapidly. Indeed, some analysts point to the current growth rate of Internet penetration in China (4 to 5 percent per month), anticipating that 25 percent of the Chinese population could be connected by 2005.[4] This would mean more than 300 million people could be connected—more than twice the present Internet population worldwide.

Figure 1. **ICT Penetration in China, 1982–2002**



In 2002, Chinese consumers are expected to buy more than 10 million PCs, or one in thirteen Intel microprocessors (Sheff 2002). China is also a major importer of computer chips—domestic demand for semiconductors was forecast at US$270 million for 2002.[5]

Clearly, the trend that foresees China as perhaps the most significant emerging player in global ICT markets is unlikely to be reversed. However, leadership transition and the

demands of the WTO implementation process will have a significant impact on the pace and nature of its growth.

Towards Full WTO Membership: Impact on ICT Competitiveness

The fifteen years of complex negotiations that eventually led to China's accession to the WTO have raised important policy issues, and many of the choices made to address these issues will have heavy implications for China's ICT competitiveness.

Milestones before WTO accession

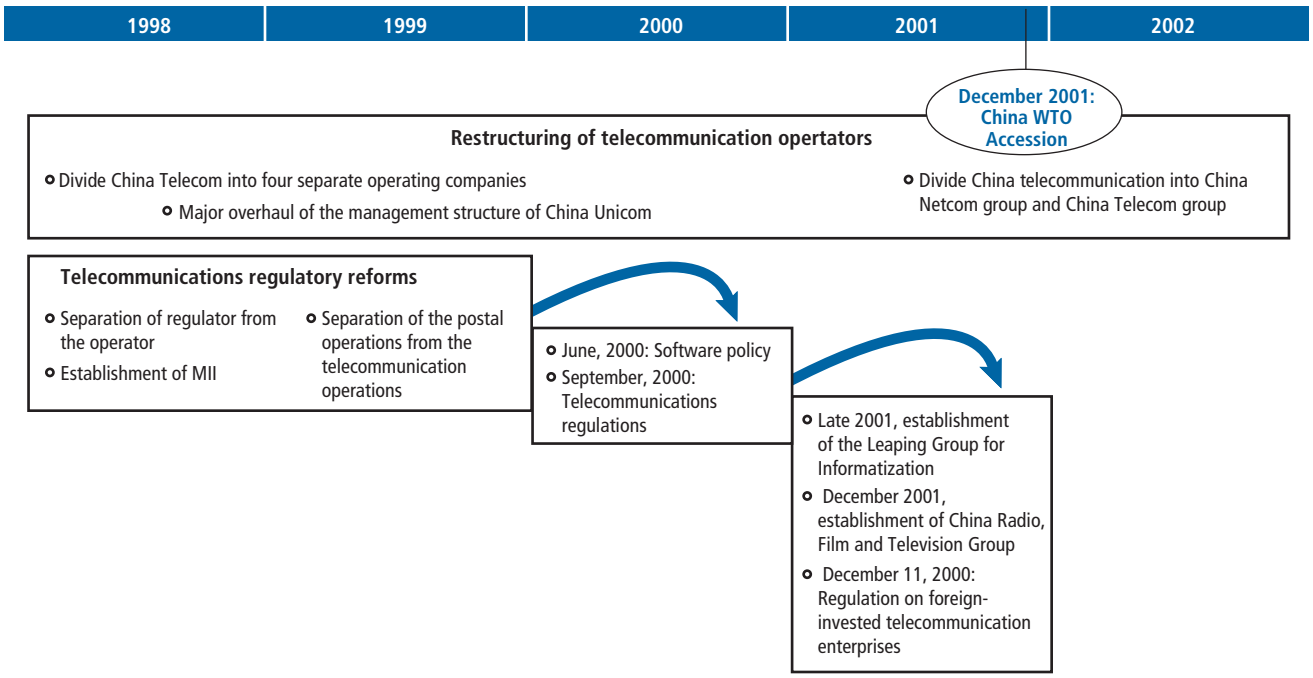
Joining the WTO clearly provides China with an opportunity to further accelerate the changes needed to modernize its economy. First and foremost, the opening of numerous sectors across the economy will push forward reform in state enterprises and the rationalization of sectors in terms of capacity, production technologies, and delivery systems. Companies or sectors that have been reluctant to change, or found change politically difficult, will now have an iron deadline for reform. By the same token, there is widespread acknowledgement that although the WTO membership will bring long-term benefits, it will also require many short-term sacrifices from a number of social sectors. Government officials who would otherwise find their agenda jeopardized by the implied sacrifices of politically difficult or sensitive reforms could use the idea of WTO membership to justify these reforms.

In the ICT sector, WTO accession is being felt most significantly in the sector's regulatory framework. In the mid-1990s, even before the accession to the WTO was sealed, China had already begun the process of revising the regulatory regime and clarifying industry structures so as to be consistent with WTO commitments. More than 2,300 existing laws and regulations have been examined, and sometimes revised or invalidated, and additional statutes on foreign investment, intellectual property, and other on previously sparsely-regulated areas, have been implemented. Figure 2 illustrates a number of milestones in the ICT sector that the Chinese government has passed since 1997, on the road to WTO accession (1997 is the year of the WTO Basic Telecommunications Agreement [BTA]).

The following four elements prepared the ground for China's WTO accession as well as for its WTO commitments implementation:

1. The Ministry of Information Industry (MII)'s declared objective of dividing China Telecom into four separate operational entities; this was intended to create a competitive telecommunication services market. The restructuring of the telecommunications sector therefore reaches far beyond the dissolution of China Telecom.
2. China's Software Policy (adopted in June 2000), to ensure growth in its software and service industry. The policy, coupled with tax incentives and investment and funding policies, is strongly focused on setting up high-tech

Figure 2. **Timeline of Key ICT Policy Events Before China's WTO Accession**



zones and on enhancing the competitiveness of domestic firms in software markets.

3. New Telecommunications Regulations.
4. The Regulation on Foreign-invested Enterprises, signed by Premier Zhu Rongji as chairman of the recently formed State Council Commission for Information Industries, which is a policymaking body set up to coordinate the development of the national information infrastructure.[6]

In the "pre-Doha" years, the government's "Golden projects" also played a major role in developing information networks. Initially (i.e., in 1993), these projects were comprised of three elements: Golden Bridge (National Public Information Communication Network), Golden Card (Electronic Payment Project), and Golden Gate (Foreign Trade Information Network). Since then, a series of other programs[7] have emerged. While the agenda of the initial projects was the rollout of information networks, these later projects have generally involved applications that use the information infrastructure (Qiang 2001).

In addition to these programs, local and national governments have provided assistance through preferential policies towards companies choosing to establish in high-tech and science parks. Beijing has been the most forthright in promoting itself as China's Silicon Valley through the development of Zhongguancun, which is close to top schools Peking University and Tsinghua University. A negligible presence three years ago, Beijing currently holds one-third of the national software industry production; this change in position is mostly because ten leading software companies are located in that city. Zhongguancun also houses a number of small and medium-sized software companies, which make up the vast majority of the 600 certified software companies in the city. Moreover, the city has committed to investing US$1.2 million to further promote itself in the international software community (ChinaOnline 2001). It has also established preferential conditions for overseas students to encourage them to return to the area and establish businesses.

Impact on China's ICT competitiveness

As Figure 3 shows, the impact of China's WTO accession on the country's ICT competitiveness is being felt through several key channels: the reform of the ICT-regulatory regime and operating environment, the creation of a framework to access capital, and the adoption of advanced technology in both the ICT sector and other areas of the economy.

Before China's accession to the WTO, the pressure from "entry requirements" played a direct and catalytic role in encouraging China's government to restructure the country's ICT regulatory regime and industry.[8] The lengthy negotiations and the threat of foreign competition have thrown the country into a market mode, and paved the transition to a competitive ICT market. Sources of investment are changing, resource-planning management is undergoing radical changes as the industry restructures, and tariff policies have shifted away from transfer pricing and closer to cost-based pricing. As a result, the growth of China's ICT infrastructure has been more than three times faster than its growth in GDP. China is now the second largest fixed line and mobile telephone market in the world, just behind the United States, and it is the largest pager market in the world. Given current trends, China will soon become the largest telecommunications market in the world (at least for traditional voice services).

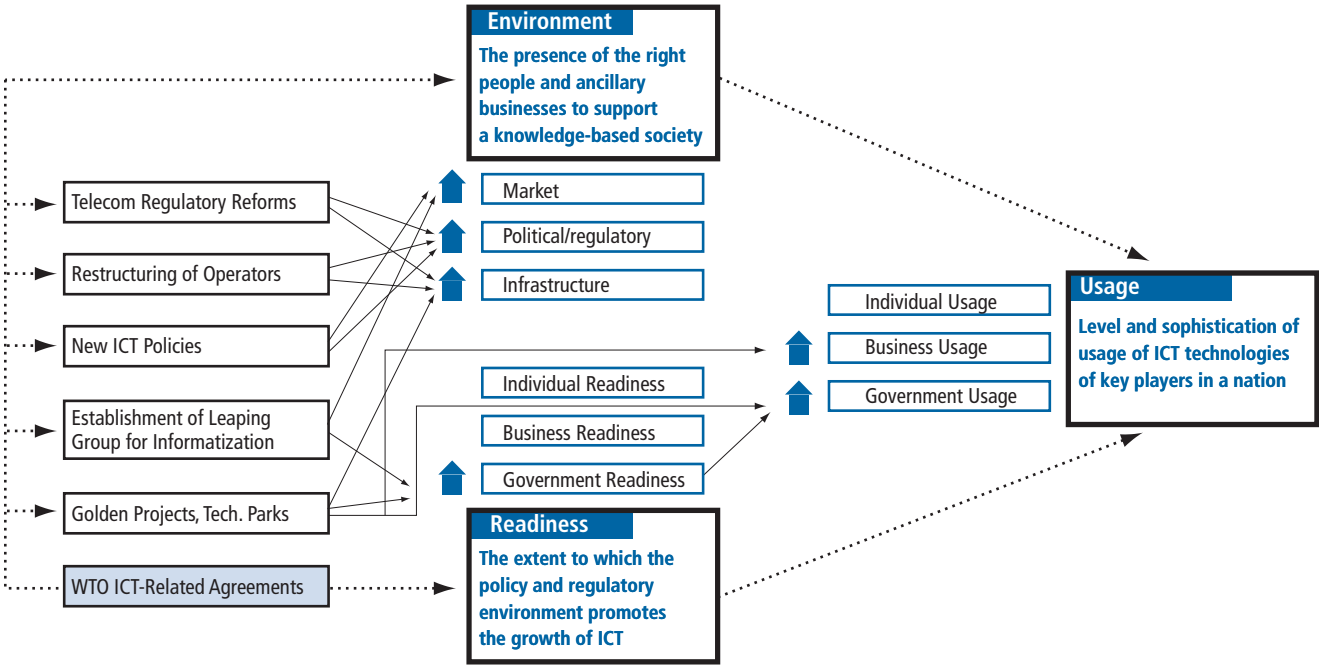
The establishment of the State Council Informatization Office clearly demonstrates that the Chinese government is now ready and eager to promote the development of ICT as a matter of strategic priority. Along with government-supported application projects, the internal operations of governments and the government's interface with the public can be strengthened.

The exact terms of the relevant WTO agreements (see Box 1) provide an external framework for sector reform and access to foreign capital markets, and they constitute a launching pad for a new wave of regulatory reforms that will underpin the next phase of the sector's competitive expansion. Improved market access and further tariff reductions will facilitate the import of advanced technology and equipment and help upgrade China's basic manufacturing capabilities and competitiveness. It will also provide an officially-sanctioned conduit for acquiring foreign technical expertise and management, an area in which China lags far behind its Asian peers. Equally important, the Chinese manufacturing sector can look forward to leveraging its low-cost base and manufacturing efficiencies in order to reach ICT global markets, particularly as the next generation of wireless and Internet product lines emerges. WTO entry will have an even greater impact in the adoption of technology into the services industries, which have, until now, been highly regulated, restricted, and fragmented, with little integration of technology. Boxes 2 and 3 provide more detail on two of those service industries: financial services and manufacturing supply chain integration.

Adhering To and Enforcing WTO Commitments: The Challenges Ahead

Although there is a consensus that China's WTO accession will have positive impacts on the importance of China's market and businesses at large, many have questioned China's compliance (see Table 1). China, like most other nations that signed the WTO agreement, expects obvious

Figure 3. **Impact of the WTO Process on China's ICT Competitiveness**



Box 1. China's ICT-related WTO Commitments

Telecommunications

1. China has conformed to the WTO's BTA and has agreed to adopt regulatory reforms in many areas. Reforms include the establishment of an independent regulatory authority and competitive safeguards, the introduction of cost-based pricing principles and technology-neutral scheduling,[9] and changes in the allocation and use of scarce resources and in rights of interconnection for different carriers.
2. Foreign equity and participation in the telecommunication sector[10]—foreign suppliers may use whatever technology they choose to provide telecommunication services.
3. China has agreed to remove quotas and other quantitative restrictions on the supply of telecommunications equipment. Quotas will be mostly phased out by 2002, and abolished by 2005.

Information Technology

4. China has agreed to participate in the Information Technology Agreement (ITA) and will eliminate all import tariffs on IT products (telecommunications equipment, computers, microprocessors, and Internet-related equipment). Starting from an average of 13.3 percent, reductions will be made in equal annual increments to reach 0 percent in 2005.
5. China's WTO agreements also entail the removal of restrictions on trading rights, such as the right of foreign companies to import, export, or distribute in China without going through middlemen or local partners. This measure will open up wholesale and retail businesses, and maintenance, repair, and other distribution activities related to direct foreign participation. Trading rights will be phased in over a three-year period.
6. Foreign companies will be able to compete in the provision of professional services in the computer and related service industries. China has also agreed to eliminate foreign exchange balancing requirements, local content obligations, and technology-transfer agreements in accordance with WTO agreements on the protection of intellectual property rights and trade-related investments.

In General

7. Fair competition—China will have to apply the same standards on taxes (such as value-added tax or tax deductions) to all firms, regardless of their origin (domestic or foreign).
8. Autonomous management strategy—China has pledged to respect the WTO rules in the area of Trade-related Investment Measures (TRIMs).

gains, such as increased efficiency, availability of a wider range of better-quality services, greater opportunities for the rapid introduction of new technologies and, most important, lower costs for consumers. These gains would translate into significant benefits for the Chinese economy as a whole; joining the WTO is seen as a catalyst, bringing such gains within reach in a shorter amount of time than would have been possible without accession.

In order to successfully advance their strategy to cultivate a "knowledge-based economy" that will fuel China's economic growth and trade, Chinese government officials will need to carefully consider the economic opportunity costs of and the policy challenges associated with developing the ICT sector. Likewise, the Chinese business community will also have its own series of trade-offs as it seeks to upgrade to face foreign competition, meet competing investment needs, satisfy various interest groups, and define core competitiveness. Overall, the question for China is how they can balance the need to strengthen ICT and industrial competitiveness while rigorously implementing WTO agreements.

Trade-offs

In adhering to its commitments as a WTO member, China will face difficult choices in at least five areas: foreign investment, content control, intellectual property, innovation, and competition. Analysis of these trade-offs grants an understanding both of the competing interests that government must balance in implementing WTO commitments and of the new competitive demands on business.

Ownership control versus foreign direct investment

In the area of FDI, the Chinese government is in a dilemma. On one hand, the government favors well-financed competitive telecommunications and IT markets; on the other hand, it intends to secure its control over the ICT sector. For centuries, China had a tradition of mistrust for and minimal contact with foreigners; then the country suffered a century and a half of mistreatment and subjugation by Western powers. The combination of these two periods could be expected to reinforce isolationist tendencies, yet modern China's growth is driven by foreign technology and investment, and its economic growth is highly dependent on exports. China routinely trades access to its market for foreign technology and investment while guarding its sovereignty and autonomy with a ferocious zeal. In strategic sectors such as ICT, the task of China's leadership is to simultaneously attract foreigners and hold them at bay.

There is also a worry in China that national security might be compromised by FDI. In some quarters it is thought that foreign ownership of telecommunications facilities might enable state secrets to be leaked easily, and that telecommunications infrastructure might be out of national control during a state emergency, such as in a time of war (Wang 2001). The latest evidence of such concerns is the newly announced Regulation on Security Control over Computer System and Internet that forbids organizations from purchasing security-protection software from foreign vendors (Xu 2000).

China is now formally a member of the WTO. For the Chinese government, the challenge is no longer how to block FDI, but how to exploit the full benefits of FDI while maintaining a "forbidden zone" in which FDI is not allowed. WTO also provides Chinese operators with an opportunity to penetrate foreign markets. The state ownership of Chinese operators could place them in a vulnerable bargaining position, as was demonstrated by the merger negotiation between Singtel and Cable & Wireless HKT in 2000.[11]

Content control versus knowledge sharing (business opportunities)

The Chinese government is challenged by the conflicting goals of maintaining control over information entering and leaving China on one hand, and fostering the commercial potential of the Internet on the other hand (Perritt and Clarke 1998:407). It appears that the desire to foster greater technological development and expertise in China will be of such overriding priority that the government is willing to accept the challenges associated with regulating, and thus restricting, Internet access. Furthermore, the continued explosion of Internet access in China, combined with increased trade and electronic commerce[12] with foreign companies, will further challenge the ability of the Chinese government to control access to what it may consider objectionable content on the Internet.

Although Chinese individuals and businesses can access information on ChinaNet via the China World Web—a vehicle for electronic content meant to provide limited global Internet access and international business information to China—most Chinese people cannot access the global Internet due to regulations and firewalls imposed by the Ministry of Information Industry that block viewing of selected material and Internet sites. Currently, the Chinese government is using state control,[13] encryption,[14] Internet policing,[15] and news monitoring[16] to control much of the content that comes into the country and to decode and monitor Internet content and traffic. However, as the numbers of Internet users and websites continue to grow, the Chinese government will find it increasingly difficult (including financially and technologically) to censor material on the Internet.

Table 1. **Foreign Businesses' Views About China's WTO Membership**

	December 1998 Survey of US Businesses in China[17]	May 2000 Department of Commerce Survey[18]	2001 ACC Annual Membership Survey[19]	October 2001 Deloitte-Touche Tomatsu Survey[20]
Effects of China's WTO Membership	N/A	N/A	More than 75% expected China's WTO entry to have a positive impacts on their companies.	Importance of the Chinese market will increase (90%). Expect to expand existing business (65%).
Challenges of Doing Business in China	Problems with transparency (2/3); cost of doing business, customs procedures, foreign exchange volatility (more than 1/2).	Expected difficulties with corruption, transparency in practices, and in regulations (1/2).	Transparency, bureaucracy, weak enforcement of laws, business scope restrictions and protectionism (at least 2/3).	Increased competition from foreign competitors (2/3); fraud, piracy, political upheaval and foreign exchange volatility (1/3)
Potential Compliance Problems	N/A	Feared retaliation if they reported WTO compliance problems (1/2). Concerned about China's ability to develop a WTO-compliant legal framework and enforce the obligations consistently (70%).	Concerned about China's WTO agreement being ignored, new regulations to counter WTO commitments (75%).	Implementation of WTO commitments (90%), regulatory environment was the concern for most respondents.
Profitability	Already profitable (60%).	N/A	About 50% reported that their operating margins had improved while 25% had deteriorated from 2000 to 2001.	About 50% expected their investments to be profitable in less than three years while 33% in 3–4 years.
Familiarity with China's WTO Commitments	N/A	Reported they did not understand WTO obligations for their sector (66%).	N/A	Had great deal of familiarity (10%); had a certain amount of familiarity (64%).

Summarized by the authors from GAO (September 2002)

The Chinese government has to think in terms of being internationally competitive in business. Chinese businesspeople need to know as much as their foreign rivals in order to compete; therefore, they need the outside information, but this information may become almost inaccessible in China if the government bans too many outside sites.

The public good versus the intellectual property regime

Institutionally, China's entry into the WTO will also mean agreeing to be monitored and reviewed by the TRIPS (trade-related aspects of intellectual property rights) council and accepting the TRIPS dispute settlement mechanisms. The WTO gives developing countries a transition period of five years to enable them to adhere to all TRIPS requirements. China has been quite eager to embrace intellectual property regime (IPR) reforms in the last decade. Starting from a situation of near total absence, China has adopted laws covering patents, trademarks, integrated circuits, plant varieties, unfair competition, and copyrights. China has joined nearly all major international IPR conventions, and is a member of international procedural treaties on the classification of patents and trademarks and the patenting of microorganisms. The country has also made considerable progress in establishing education and training programs in IPRs and in upgrading its administrative and legal enforcement systems in that area (Maskus 2000).

There are serious economic trade-offs involved in an IPR; these trade-offs arise from externalities and consequent market failures. Intellectual property is based on knowledge and information, and therefore has characteristics akin to those of public goods. Their efficient use requires wide access to all users at marginal social cost. At the same time, dynamic efficiency requires that innovation be encouraged over time, and this calls for intellectual property protection.

Many other problems remain, particularly from the point of view of outsiders who observe massive product counterfeiting and who doubt the effectiveness of enforcement mechanisms (LaCroix and Eby-Konan 1998). There seems to be a commercial reluctance in China to place monetary value on ideas and knowledge in its many

forms, including software. It is understandable that placing value on intangibles, or services, is conceptually difficult to grasp in a society that has not previously worked in that mode, but until China develops substantially more domestic innovations that could make gains on global markets if they were patented and protected,[21] there will always be the temptation to pirate products. For this reason, the thorny problem of IPR is looming in China, and WTO membership is bound to exacerbate the potential for dispute.

Technology transfer versus innovation system

China's entry into the WTO can create a major opportunity for learning about technologies and for importing new technologies. The challenge is to learn quickly and develop domestic capability before costs become too high. Developing an interactive and sustainable innovation system with positive feedbacks will require the identification and development of strategic complementarities between capital expenditures, such as expenditures on R&D and human resources. Currently, the government estimates that more than 600,000 technicically skilled workers are needed annually, but it can only supply around 180,000 from all sources, including its own universities and technical institutes (ChinaOnline 2001). Therefore, upgrading education and training and rapidly developing ICT infrastructure have become urgent policy objectives for China.

Box 2. **ICT and Financial Services in China**

China's two leading state-owned banks, Bank of China (the most international) and ICBC (the largest in terms of assets) have accelerated technology integration internally and externally (through online banking for customers). In December 2001, the Industrial and Commercial Bank of China announced that trading on its electronic banking site had reached RMB 500 billion in the first eleven months of the year. This is minimal; as many as one-third of Internet users are still are not confident that online transactions will be secure.

A study by the People's Bank of China reveals that more than twenty banks offered Internet or telephone services to their customers. The level of uptake by customers of these services will only increase; this is one area of banking where Chinese banks can gain a lead over foreign competitors, who are thus far not allowed to compete in the online banking service market (Economist Intelligence Unit [EIU] 2002a). As it integrates technology into internal operations,[22] ICT is also enabling the Bank of China to increase its competitiveness. The effects of these moves on overall firm productivity remains to be seen, but if developed markets can be used as a guide, the impact will be significant.

Technology integration will also require a rational and innovative selection of those technologies (imported or developed indigenously) that best suit the local technological and economic context. The current lack of separation of R&D activities from production activities seriously hinders China's technological development. A critical element in China's efforts to build a sustainable innovation system will consist of the separation of pre-competitive support of innovation needs from the actual development and marketing of innovation-intensive products. In this area, clear guidelines and incentives for both state and nonstate enterprises will be necessary.

China is both a developing country and an economy in transition. Being a developing country means that, for some time, learning and imitation will be major sources of technological progress for China. The progression from an economy in transition with a command economy to that of an economy in transition with a market economy implies that the national innovation system is also being transformed. That is, the responsibility of carrying out technological learning process will shift from central research and design institutes to enterprises, and those very enterprises must adjust to a completely new environment.

The growing number of in-house R&D facilities run by overseas educated Chinese has helped to reverse China's brain drain so that now there is a brain "pull;" many of China's top students who studied abroad and stayed away to work are considering returning home.[23] Legend, early in its development, even took the unusual step of offering its employees stock options after listing a subsidiary in Hong Kong in 1994.

Another side of the problem of technology transfer lies in the tendency for attention to be focused on only the top tier of most competitive of domestic companies in considering the industry as a whole. For instance, in supporting indigenous technology development or facilitating the acquisition of foreign technology, the government may be tempted to focus on the larger companies which lead the market, while in fact most companies in the sector may be smaller companies. These smaller companies—which may be private or converted township and village enterprises—have foundered because their products do not match the quality of their urbanized or coastal cousins.[24]

Survival of the fittest versus social stability

China's accession to the WTO means not only more opportunities,[25] but also more competition. Now that the market is open, China's best enterprises have to compete with the best in the world, but China's enterprises can enhance their competitiveness and ensure their long-term survival through improved access to imported technology,

materials, human resources, and services as well as by access to outside markets. The divide will not only be between Chinese and foreign companies, but also between companies that previously benefited from China's closed economy and those that suffered from it. The domestic level of awareness, acceptance and preparation is still low.

For smaller companies, an expanding market existing alongside new-found competition could be simultaneously beneficial and detrimental. Good products do not guarantee survival. Problems in accessing capital for growing technology companies are widespread. Foreigners come to China expecting to invest before making profits, and while large state-owned cousins have deeper pockets or access to state capital, many private or hybrid small- and medium-sized enterprises (SMEs) cannot secure bank loans because there is a bias against private companies. SMEs are thus neither able to expand their operation nor retain workers. In response to this funding problem, the government has pushed forward several programs specifically to ensure funding for growing ventures. While some have benefited from these programs, others—especially township and village enterprises—have foundered because their products do not match the quality of companies in urban or coastal areas. For many, survival depends on their relationships as subcontractors or service providers to multinationals or larger Chinese companies, on the high rate of China's economic expansion.

Undoubtedly there will be winners and losers. Technology has the potential to enable and catalyze the restructuring of China's old industrial enterprises, but in the short term, these dramatic changes will yield more jobless for local governments whose coffers cannot sustain the load. If social safety nets and re-skilling mechanisms are not in place, joblessness can in turn cause social instability and diminishing public confidence in the government, which could erode China's commitment to adhering to its trade obligations. Thus, mastering the art of transitioning unemployed laborers of the old economy into the age of technology will be a formidable challenge, which in scale alone will be unlike any attempted in other areas of the world.

Rule of law and enforcement of WTO commitments

A key concern about China's WTO accession has been the ability and willingness of the Chinese government to fully implement its WTO obligations. China's domestic problems—corruption, protectionism, unemployment, and inefficient state-owned enterprises and farms—could make it difficult for Beijing to comply with the WTO agreement. China's traditional legal system poses additional obstacles to the rule of law, especially problems of enforcement of civil court orders.

Starting around 1999, various bodies of the Chinese government have promulgated a series of laws and regulations on the Internet that appear hard to implement and are sometimes contradictory. There are several explanations for this situation. The separation between Internet control protocols, Internet service providers (ISPs), and e-commerce ventures is not always strict, making it difficult to ban only certain kinds of Internet activity. Moreover, the implementation of Internet regulations is often subject to competition between the MII, regulating ISPs, the State Bureau of Secrecy (which enforces the ban on transmitting "state secrets"), and the State Administration of Radio, Film and Television (which generally oversees content provision).[26] This reinforces the urgent need for Chinese authorities to jointly address and analyze Internet and telecommunications.

China's accession to the WTO requires that Chinese leadership accept greater transparency and accountability, as well as international norms that are essential to the proper implementation of the rule of law. Having accepted the legal structure and agreements endorsed by other WTO members, China now faces greater pressure to reform its own judicial and regulatory systems in order to make investors confident that they will receive fair and equal treatment in their business transactions with China. Among the international business community, some still fear that:

1. New invisible trade barriers could emerge to thwart market entrants;
2. There will be no indication anytime soon about what licenses or radio spectrum may be available for foreign-backed enterprises;
3. No date would be mentioned soon for the establishment of an independent regulatory authority and the implementation of the Telecommunications Law
4. Policy would remain unclear over the repatriation of proceeds by foreign investors;
5. Uncertainty over local employment regulations would linger;
6. Freshly detailed regulations could impose complex investment criteria;[27]
7. The influx of competition may create a price meltdown and thus diminish investor's anticipated margins, especially in the equipment sector.

For the business community, access to investment capital and the capital to acquire the most relevant technologies are critical to realizing the benefits of ICT—this applies to ICT companies and to companies in other sectors. The current capital-raising environment in China still presents many obstacles for the business community:

1. Stock listings take relatively long, and conditions for approval of listing are not always transparent;
2. Banks are under pressure to upgrade risk levels and may be wary of lending, especially to private or small and medium-sized firms;
3. Venture capital is still relatively underdeveloped because of the lack of exits, unclear shareholding rights, and the inability to gauge firm quality, among other reasons.[28]

The outside world is concerned that China will implement WTO protocols without having first established a clear set of regulations, procedures, and enforcement mechanisms. Against the prospect of a chaotic influx of foreign capital into dubious service ventures, heavy-handed intervention—which may have been acceptable in the past—will be open to scrutiny by the WTO courts. Any perceived increase in the level of uncertainty affecting China's regulatory environment would be likely to raise the level of investment risk and act as a brake on foreign capital inflows.

Multiple Roles of the Government and Building Blocks of Competitiveness for Businesses in the Post-Doha Era

In the field of ICT, as in many other areas, the Chinese government is expected to remain a central player for quite some time. WTO commitments should help combine this fact of life with imperatives that enhance enterprises' competitiveness.

Government roles, old and new

Now that China is a full member of the WTO, its decision makers will have to carefully try to seize opportunities while addressing significant challenges. In this complex game, the Chinese central government still holds many of the major cards of the post-Doha era. One of its main tasks will be to think and decide the extent and nature of its own role. Many major changes are currently called for in China, not only about ways of doing business, but also of thinking about business. This may prove to be a difficult, and even painful, process.

In China, the role of the state is bound to remain of central economic importance. However, the government's role can slowly be shifted from micromanagement to macrocontrol. By being vision provider, lawmaker and regulator, innovation promoter and coordinator, and an ICT leader (see Figure 4), the government can provide the predictable, accountable, and reliable environment that enterprises need to be able to make their own decisions and take their own risks.

Vision provider

Resource allocation. Matching the supply of resources to competing demands and estimating likely resource growth to fuel future development is a process of fundamental importance to the achievement of economic and social progress. The Chinese government needs to prioritize resource allocation for the country's information infrastructure. The development of ICT competes with other urgent needs on the government's budget agenda. Therefore, government officials should concentrate the country's limited resources into developing the basic facilities of the ICT industry.

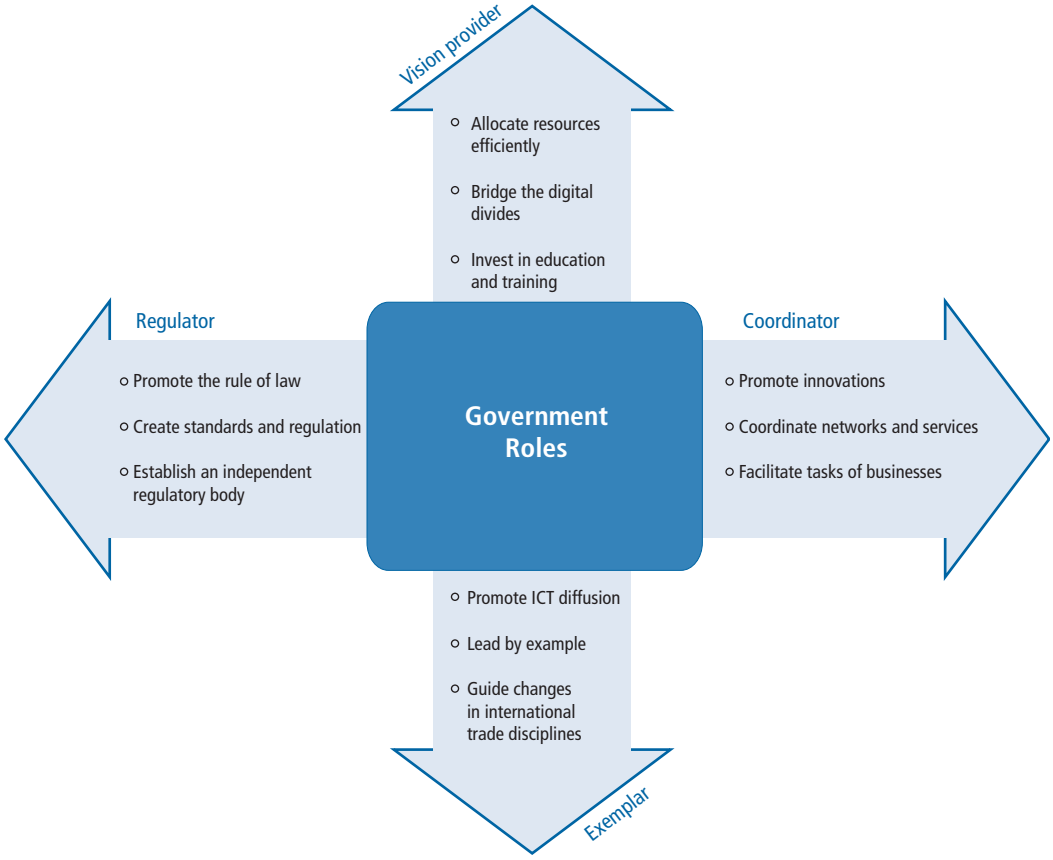
Fighting digital divides. Growth by itself will alleviate some poverty; but for ICT to have a significant impact on the poor and low-income groups in China, policies will have to be developed for allowing these groups' access to ICT in such a way that their capabilities are rapidly enhanced. This is unlikely to happen simply as a by-product of joining the WTO. China remains committed to a national information infrastructure that includes among its goals access in the underserved central and western provinces[29] where most of the population reside. Therefore, a comprehensive approach that includes both growth and distributional objectives, in particular, policies for poverty alleviation that are also growth-promoting along with structural reform and technological modernization policies, seems to be the most reasonable course for the Chinese economy.

Education and training. The government needs to accelerate the education and training of qualified personnel for ICT development. China encourages educational universities to have R&D alliances with leading international companies and academia. In 2001 the top ten Chinese universities received more than US$200 million from the Ministry of Education for research projects.

Lawmaker/regulator

Establish rule of law. To solidify its membership in the WTO, China must first establish and promote the rule of law upon which all economic activities will depend; China must develop the required policies and regulations that fit its own political, economic, and cultural realities. Currently, there is no telecommunications law governing policy formulation, nor is there a consensus-based framework for guiding decisions. The lack of a codified law makes regulation often intractable, conflicted, complicated, and inconsistent. In addition, the absence creates a gray area; sometimes opportunities are increased, and sometimes risks. Without a sound institutional infrastructure, China cannot stimulate the formation of domestic companies and facilitate technology transfer and investment from foreign firms.

Figure 4. **Multiple Government Roles**



Modify legal framework. Entering the WTO provides China with a perfect opportunity and incentive to adjust its legal framework. China needs to change its traditional pattern of sporadic and ad hoc interventions into a transparent legal and regulatory framework. This could very well be the next revolution in China's economy. Clear signals about standards and regulations governing interconnection, commercial transactions, international technology transfer or adoption, and service benchmarks, as well as the creation of a truly independent regulatory body to oversee the ICT industries and convergence, would be welcomed by the international community. These steps are crucial for China to develop an environment of greater openness and transparency; such an environment would have a positive impact on investor and consumer confidence, and further stimulate economic development.

Innovation promoter and coordinator

Innovation promoter. A partnership between the state and the private sector is developing in China through financial, infrastructural, and other supporting relationships in the ICT sector. Both the government and the nonstate actors emphasize the fundamental importance of technological education. In the computer sector, many Chinese enterprises began with foreign-designed products and planned to ultimately produce their own designs; this type of strategy requires scientific knowledge and technical/higher education. The long-term expectation is that China will have an innovation system in which enterprises play a critical role in close collaboration with universities, academic institutions, and nonprofit and government research institutions.

Coordinator. The government has a critical role to play in coordinating networks and information services and promoting healthy competition in order to increase efficiency and avoid waste. The poor performance of the former State Council's National Information Infrastructure Steering Committee between 1996 and 1998 cast doubts on the effectiveness of this new group. To overcome these doubts, the new State Council Informatization Office will have to prove able to transcend competing individual interests among its members.

Facilitator. Government authorities (central and local) have a critical and leading role to play in facilitating enterprises' (Chinese and foreign) creation of wealth and jobs. Government leadership in providing fiscal incentives and the simplifying procedures is valuable in this area. Applying ICT to traditional public fields (e.g., through e-government) could enhance governmental efforts in that context.

Exemplar: ICT leader at home and internationally

The Chinese government has recognized IT as a potential thrust area, and plans to be a leading international player in this sector. In order for new technologies to be diffused in a society, however, they need to reach a critical mass. Some experts note that the critical mass is achieved when 10 percent to 20 percent of the population has adopted the innovation. In a society and economy dominated by government, as is China, the government can set the example for the country; it can promote the widespread diffusion of ICT applications, encourage ICT use at educational institutions, and improve information systems in government departments and industries. The government can demonstrate the benefits

Box 3. **Supply Chain Integration: ICT and Economy-wide Productivity Gains**

Transport and logistics, as the key elements in supply chain integration, are undergoing drastic consolidation and technology upgrading because of increased competition from foreign entry (post-WTO accession). A difficult terrain, fragmented networks, and lack of competition have produced an inefficient industry that the government now recognizes is stunting the country's growth. WTO accession opens up the sector to limited foreign participation through joint ventures in logistics, distribution, and freight services, and to full competition by 2004.[30] Market growth will be 16 percent to 25 percent in the near term as manufacturers integrate their supply chains and hone their product distribution, largely through technology integration (EIU 2002b).

Currently, China spends 15 percent to 17 percent of GDP on logistics, compared to 10 percent for most developed markets (Atkinson 2002). Companies reportedly pay 40 percent to 50 percent more than they do in the United States to move basic manufactured products (Barling 2002). The role of technology in bringing China's logistics industry up to global standards is clear: customers are now demanding better tracking and a more integrated supply chain. Technology companies are anticipating the business to be had; Legend, for example, has already set up a joint venture with APL logistics (of the NOL group) to provide supply-chain services for the IT industry (Asia Pulse 2002).[31]

Clearly, the changing framework of the ICT industry has a major impact as a ripple effect throughout the economy as businesses gain access to capital and technology to upgrade productivity and efficiency. The government is aware of the huge impact that managing information effectively, reducing transaction costs, and upgrading productivity using technology, can have on performance and productivity; businesses and individuals have begun to grasp the scale of upgrading that is becoming possible.

The elements and examples discussed above show how the newly opened environment created by China's WTO membership is likely to allow ICT to radically transform key industries and services. In order for this process to take off, the country needs to build readiness and capacity among all stakeholders in the society to enable them to use, and benefit from, the new technologies. A key ingredient in this complex process will be the manner in which the Chinese authorities choose to implement their WTO obligations and address the challenges that will accompany such implementation.

of improving efficiency, reducing costs, and of transparency and openness, if its own operations are streamlined and technology-enabled. Public databases can be developed to further encourage the sharing of information between users. Efforts in e-government (e.g., in fiscal and customs matters) can have a strong exemplary value for businesses and individuals alike.

At the regional and international level, it is not unreasonable to think that China will have the potential to guide significant changes in how the international community evaluates international trade disciplines on one hand, and development on the other. The field of ICT could be a fertile ground for such progress, and China benefit from establishing itself as a political leader in that area.

Conclusion

After fifteen years of difficult negotiations to become a member of the WTO, China is now faced with the difficulties of implementing its WTO commitments. Opening the market and allowing deeper foreign participation in the economy will drastically increase competition across the economy and place new demands on Chinese corporations. WTO accession could provide the catalyst for China to become a center of innovation, content creation, and R&D, thereby enabling the country to progressively move away from purely labor cost-based competitiveness. Its success in the ICT field will be an essential element in the countries' ability to address other challenges, such as the predictable negative impact of WTO membership on sectors of low productivity such as agriculture, and the negative impact on public sector employment (especially in state-owned enterprises).

Moreover, the adoption of modern technologies in all sectors of the economy will be essential to enabling industries that are currently saddled with overcapacity, outdated technology, and low productivity (e.g., agriculture, the public sector, heavy industry) to upgrade and improve efficiency. The government will inevitably have a crucial role in ensuring that the ICT revolution and its dynamism are brought into "problem areas" and loss-making enterprises. Significant resources have already been committed to address the digital divide and to develop "ICT poles" in poorer and predominantly agricultural areas in the west and inland provinces.

The government will also continue to play a difficult but indispensable role in addressing the "trade-offs" of WTO full membership. For enterprises, both Chinese and foreign, this means that finding the areas in which business interests, competitiveness, and profitability can be developed in tandem with the Chinese governments longer-term objectives will

be a key ingredient for survival and success on the Chinese market. Business will hence also have crucial roles to play and important responsibilities to exercise in contributing to the implementation of WTO commitments while nurturing the ICT competitiveness process. The "survival kit" proposed above (Box 4) could provide some guidance in that context.

Box 4. A Survival Kit for Businesses

Just as China's entry into the WTO has changed the regulatory and policy framework for ICT, it has also instigated a fundamental reshaping of industrial demand and of the factors of competitiveness for ICT companies. The new competitors and new market opportunities have created a new business environment, one with changing rules of competitiveness. To survive in a newly-opened market, companies, domestic and foreign, will need to redefine their core competencies while constantly assessing and responding to changing market circumstances, including the evolving regulatory framework. From an era where survival required size and a slight edge over domestic peers, competitiveness in today's and tomorrow's ICT markets is being redefined around the following key characteristics:

1. Awareness of WTO commitments and related laws and regulations
2. Access to capital and the most appropriate technologies
3. Adjustment to a management style that will lead and empower employees
4. Adaptation to consumer needs with innovation.

In many respects, the problems affecting China's ICT policies and strategies are not significantly different from those that the country is will encounter in other sectors. However, the rapid pace of technology development means that ICT issues are being addressed first or more urgently than problems in other sectors. Moreover, it is clear that the sector's development will be felt throughout the economy via the adoption of technology therefore, the government's decisions concerning ICT can also be seen as decisions on the course of the economy as a whole.

Thus far, it is clear that China's implementation of its WTO commitments is accelerating and increasing the importance of change, rather than slowing or de-accentuating it. If this trend continues in the ICT field, one may envision a situation in which China shapes global trade and the technology sector more than the world shapes China. On a broader level, this raises an even more fundamental question: will China change WTO and international trade more than WTO and international trade will change China?

Endnotes

1. Bruno Lanvin and Christine Qiang are respectively manager and economist in the World Bank's Department on Global Information and Telecommunications Technology (GICT); Pamela Mar and Frank-Jürgen Richter are respectively Senior Regional Manager for Asia and Director for Asia at the World Economic Forum. The views expressed here should be considered as the authors' personal opinions. They do not necessarily reflect those of the World Bank or the World Economic Forum. The authors gratefully acknowledge the contribution of Heini Shi, who provided useful comments on earlier drafts.

2. "In ten years, Chongqing will catch up to where Shanghai is today" (Vice-Mayor Huang Qifan, quoted in *Business Week* October 21, 2002). Chongqing is the centerpiece of China's "Go West" program, designed to boost development in the western provinces. Over the next ten years, the Chinese government is planning for investments of up to $200 billion in the Chongqing municipality. Investments in key industries (including IT) will be encouraged through a five-year tax exemption, followed by a permanent 15 percent permanent tax rate—this is less than half of the normal corporate tax rate of 33 percent. See Business Week (2002).

3. Tan and Ouyang (2002:9). There are more than 140 million mobile users and that number is forecast to increase to 210 million by 2004.

4. The composition of Internet users in China has evolved as rapidly as their number. In October 1997, only 500,000 Chinese individuals were Internet users; of these users, 80 percent were technicians or engineers and 88 percent were male. By mid-2002, of the 45 to 55 million Internet in China, the proportion of technicians and engineers has dropped below 20 percent, and women now constitute more than 40 percent of users.

5. Local supply capabilities were estimated at about 30 percent of that amount. See Yong (2002).

6. The Commission is served by the Office of Informatization, headed by Zeng Peiyan, head of the State Development Planning Commission, who is charged with implementing the policies of the Commission.

7. More than ten, such as Golden Sea (Leadership Information Network), Golden Tax (Computerized Tax Return and Invoice System Project), Golden Intelligence (China Education and Research Network), and Golden Health (National Health Information Network).

8. In an interesting paper that used a simple game theory model, Mueller and Lovelock (2000) analyzed the way four players (the Chinese government, MII/China Telecom, domestic rivals, and foreign strategic investors) interacted over access to foreign capital and technology. They concluded that China would not have opened up to foreign investment in telecommunications services without the need to bargain for WTO accession.

9. Technology-neutral scheduling precludes regulators from specifying which technologies operators should use to provide particular telecommunications services (contrary to what happened during the deliberations that held up the deployment of cdmaOne technology in China).

10. WTO Requirements and Timetable for Foreign Investment in China's Telecommunications Sector

Sector	Phase	Permitted percentage of foreign investment	Date	Geographic Scope
Value-added and paging services [a]	I	30	Upon accession	Beijing, Shanghai, Guangzhou
	II	49	One year after	Extended to 14 other cities
	III	50	After 3 years	Nationwide
Mobile voice and data services	I	25	One year after	Beijing, Shanghai, Guangzhou
	II	35	After 3 years	Extended to 14 other cities [b]
	III	49	After 5 years	Nationwide
Fixed service (including long-distance)	I	25	After 3 years	Beijing, Shanghai, Guangzhou
	II	35	After 5 years	Extended to 14 other cities
	III	49	After 6 years	Nationwide

a.This category includes electronic mail, voice mail, online information and database retrieval, electronic data interchange, enhanced value-added fax services, code and protocol conversion, data processing, and paging services.

b.The cities are: Chengdu, Chongqing, Dalian, Fuzhou, Hangzhou, Nanjing, Ningbo, Qingdao, Shenyang, Shenzhen, Xiamen, Xi'an, Taiyuan and Wuhan.

11. Singtel is the dominant telecommunications operator in Singapore, where the government indirectly holds 78 percent of its shares via its investment arm, Temasek Holdings. On January 25, 2000, Cable & Wireless announced that it was negotiating with Singtel about the possibility of merging into a single company. Hong Kong was alerted to this deal and the legislator, Chungkai Sin, pointed out that this merger might enable Singapore's government to intervene in Hong Kong's domestic telecommunications market and take over Hong Kong's position as information hub of Asia. Finally, a local Hong Kong company, Pacific Century CyberWorks, presented a counter-bid to take over Cable &. Wireless HKT. This case had not been without precedent. A few years earlier, when the mainly government-owned company Deutsche Telecom tried to take over Telecom Italia, it was a local company (Olivetti) that eventually succeeded in light of concerns that the national telecommunications system could be controlled by a foreign government. These experiences show that China may need to privatize its telecommunications system before it talks to foreign operators about mergers and alliances.

12. "Recent reports indicate that China's e-commerce transactions in 2000 totalled $9.33 billion which included $47.17 million in B2C transactions and $9.29 billion in B2B transactions" UNCTAD (2001:235).

13. In order to control the content coming in from outside the country, the Chinese government limits the number of organizations with access to the international gateways to only four state-controlled entities.

14. Last year, the Chinese government issued regulations by the newly formed State Encryption Management Commission that banned Chinese companies or individuals from using foreign encryption software. In doing so, the state is attempting to decode and monitor Internet traffic in China and thereby restrict transmissions that may be considered a threat to the government.

15. The State Secrecy Bureau promulgated regulations for computer systems on the Internet, which extended the ban on the publication of loosely-defined "state secrets" on the Internet, including e-mail, bulletin boards, chat rooms, and news groups.

16. New laws have been drafted in China to bar commercial websites from hiring their own reporters or from publishing "original" content. As a result, only news that has already been published by a state source (i.e., People's Daily, the official Communist mouthpiece, or Xinhua, the state news agency) is permitted.

17. Members of the Beijing American Chamber of Commerce (ACC) and U.S. companies identified by the U.S. and Foreign Commercial Service (FCS)

18. U.S. companies in China on the ACC and U.S.-China Business Council lists

19. Member companies of the Beijing ACC

20. Subscribers to CFO Asia, CFO US, and a China-specific newsletter; European executives surveyed in Europe.

21. Currently, product development (as opposed to basic research) is perhaps the weakest link in China's innovation system.

22. The Bank of China Hong Kong plans to invest around HKD 1.1 billion (US$141 million) into upgrading its IT infrastructure over the next two years (South China Morning Post 2002). The items to be upgraded include cooperation between departments, improving product processing, implementing a CRM function, and setting IT priorities for online services.

23. Over the past three years, Zhongguancun, China's "Silicon Valley," has attracted more than 3,500 returnees from abroad, and thus far more than 130,000 of approximately 400,000 overseas students have returned home (People's Daily Online 2002).

24. It is true that most township and village enterprises (TVEs) are engaged in low-end manufacturing, and even when uncompetitive, often have the protection of the local government to enable them to subsist until a buyer or solution can be found. However, as discussed below, among smaller companies in the IT field, good products do not guarantee survival. The days of rapid and bubble-like growth of China's manufacturing economy has produced an intricate, yet fragmented, network of competing and overlapping local concerns, which may be further overlaid by another web of ministerial departments, each vying for power and influence. Supported by provincial or regional-power networks, TVEs form the backbone of the economy outside the rich coastal areas. TVEs are ripe for restructuring and upgrading with ICT, yet face the most resistance from those who have vested interests. Enabling these TVEs to grasp technology will do much to upgrade their competitiveness and ensure their long-term survival and the survival of the rural economy.

25. In December 1999, the Development and Research Center of China State Council conducted a survey of Chinese IT-industry experts and officials on the impact of China's entry in the WTO on the country's IT industry. The results of the survey showed that 77 percent of industry experts and officials

canvassed believe that foreign investment is beneficial to the development of China's information industry in the long term.

26. Apparently irrelevant ministries often become involved in regulatory issues. For example, in March 2000, the Ministry of Culture issued the Notice Concerning Issues Related to Online Business Activities in Audio and Video Products, which barred foreign-invested enterprises that operate information networks from engaging in the online publication, rental, or sale of audio and video products. The same rules also banned all companies, Chinese or foreign-invested, from engaging in business involving the import of audio and video products or the downloading of any musical product from the Internet.

27. For example, there is no mention of management control in the newly published Provisions on the Administration of Foreign-Invested Telecommunications Enterprises. Online. http://www.tdctrade.com/report/reg/020603.htm.

28. Partnerships between domestic and foreign companies to obtain both capital and technology, has been one alternative. For example, TCL, which holds around 20 percent of China's television market share, has deepened its initial distribution partnership with Dutch company Philips, and is now considering an equity investment. Sumitomo and Toshiba have already become strategic investors in TCL, with a 2 percent share. Companies' ability to access, and adapt or enhance the latest technologies for domestic use is the key. As such, foreigners seeking local knowledge can meet their needs while satisfying a domestic company's need for capital.

29. Ongoing efforts to bring advanced telecommunications (including wireless, WiFi-type Internet connectivity) to the western provinces are evidence that this objective is a priority of both Chinese authorities and of multilateral institutions such as the World Bank.

30. Logistics is not part of the current (tenth) five-year plan, although distribution is a part of the plan. Numerous government officials have spoken out about the need to modernize and upgrade the logistics and distribution sector.

31. Legend has already signed with i2 Technologies to use their supply chain management software, and other state owned enterprises looking for the clearest way to boost efficiency in production are also seeking technology (Financial Times 2002).

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