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Intellectual Property Rights in China: The Changing Political Economy of Chinese-American Interests

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Abstract

We review the evolution of modern Chinese intellectual property right (IPR) laws and enforcement and explore economic and political forces involved in international conflicts over Chinese IPR protection. Our analysis considers why the U.S. and China moved from conflict to cooperation over intellectual property rights. Structural and institutional aspects of the political economy of IPRs within each country are considered, and data on Chinese-U.S. trade in intellectual property-intensive goods are examined. We conclude that although enforcement of IPRs within China continues to be relatively weak, Chinese IPR institutions are converging on those in the OECD nations.

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I. INTRODUCTION

Relations between China and the United States have become increasingly complicated over the last decade, with a large number of political and economic issues in dispute. Prominent among these issues have been the recurring disputes between the United States and China over Chinese protection of foreign intellectual property. Since 1991 four bilateral agreements between China and the United States have addressed Chinese protection of intellectual property rights (IPRS). While the agreements were accompanied in the mid-1990s by U.S. complaints over violations and subsequent bilateral tensions, the end of the millennium saw increased Chinese efforts to enforce foreign and domestic IPRS and less tension over the issue between the two governments.

Our focus in this paper is on the economic and political foundations of the ongoing disputes between the two governments as well as the rapid convergence of Chinese IPR law and enforcement to OECD standards. International politics have clearly played an important role in the disputes. For example, the 1996 dispute over IPRs was, at least in part, a spillover from the wider sphere of U.S.-China relations, in particular the contention over Taiwan policies and the 1996 visit of Taiwan's president to the United States. Domestic politics have played a role in the disputes, with the mid-1990s leadership transition in China (from Deng Xiaoping to Jiang Zemin) and the 1996 U.S. presidential election increasing the need for politicians in both countries to become less flexible in their public stances, thereby further extending IPR negotiations and deepening tensions. Economic considerations have also played a fundamental role in these disputes. As a net exporter of intellectual property as well as IPR-intensive products, the United States has incentives to pressure China to upgrade IPR laws and enforcement, while China, a net importer of intellectual property and IPR-intensive goods, has incentives to

resist.¹ Relations between the two parties are tempered by the limited capacity of China's legal system and society to change rapidly in response to both domestic and foreign pressures. We argue that China's desire to join the World Trade Organization (WTO) fundamentally changed the nature of the game due to the WTO's strong minimum standards for IPR laws and the veto held by the United States and the European Union over Chinese ascension to WTO membership.

II. IPRS IN CHINA AND RECURRING DISPUTES WITH THE UNITED STATES

Prior to its enactment of modern IPR laws in the 1980s, China had three decades of checkered experiences with intellectual property institutions borrowed from the USSR. The October 1949 founding of the PRC was followed in August 1950 by the promulgation of the central government's Provisional Regulations on the Protection of Inventions Rights and Patent Rights.² Inventors were awarded a "certificate of invention," entitling them to recognition and monetary rewards tied to cost savings from their inventions. The state retained the right to exploit the invention. Procedures for registering trademarks were also promulgated in 1950, although few marks were registered. In 1963 new trademark regulations were issued requiring trademark registration, with the intent being to improve product quality. Publishing regulations provided authors with rewards based on the nature of the work, quantity and quality of Chinese characters, and number of copies printed.

The Cultural Revolution (1965-1976) led to the complete breakdown of this system. The professional activities of scientists, artists and writers were severely restricted, and regulations governing compensation of authors and inventors were

¹ See Gruen and Prior (1996).

² The following two paragraphs are based on Alford (1995, ch. 4).

generally ignored or repealed. Restoration began only in 1977 when the “Four Modernizations” program focused on strengthening China’s capabilities in technology and science. After 1978, under Deng Xiaoping, China passed patent, copyright, and trademark laws that meet most international standards; established major organizations for training officials, registering rights, and adjudicating disputes; and made great strides in enforcing its new IPR laws. The rapid progress was accompanied from the start by external pressure from the United States and the European Union.³ China’s opening to foreign trade in the early 1970s triggered concerns by foreign firms selling products in China that Chinese law did not protect IPRs attached to these products. The 1979 Agreement on Trade Relations between the United States and China specified that China would adopt international IPR standards to protect intellectual property embodied in traded goods from the United States.

Since 1980, China has made extensive progress in joining international IPR conventions, passing domestic IPR laws, and establishing registration, enforcement, and training procedures. We briefly review major accomplishments.⁴

- **International Conventions.** Beijing has joined virtually all major international IPR conventions, beginning with the World Intellectual Property Organization in 1980; the Paris Convention in 1984; the Madrid Protocol and the Washington Convention in 1989; the Berne Convention and the Universal Copyright Convention in 1992; the Geneva Phonograms Convention in 1993; and the Patent Cooperation Treaty in 1994. Beijing also adheres to the Budapest Treaty on Deposit of Microorganisms; the Nice Agreement on Marks; the Strasbourg Agreement on international patent classification; the Locarno Agreement on industrial design classification; the Revised International Convention for the Protection of New Varieties of Plants; and the 2000 Patent Law Treaty.
- **Domestic Laws.** Beijing got off to a fast start with passage of its trademark law in 1982 and its patent law in 1984 but was slower to adopt other basic statutes. Its

³ US and British pressure on China to establish IPRs has a long history, beginning after the Boxer Rebellion in 1900. The Mackay Treaty of 1902 with Great Britain and China’s 1903 treaty with the United States both allowed for protection of foreign trademarks (Alford, 1995, ch. 3).

⁴ See Yu (1994), Yeh (1996), and Pun (1996) for more extensive discussions.

copyright law was delayed until 1990 and regulations protecting computer software were not enacted until 1991. Decisions of the National People's Congress Standing Committee in 1993 and 1994 have strengthened penalties against counterfeiting and infringing on copyrights. China enacted new copyright and trademark laws on October 27, 2001 to bring them into conformity with the TRIPS Agreement. An amended Patent Law was approved by the People's Congress in August 2000 and came into effect in July 2001. China issued new regulations for protecting plant varieties and layout designs of integrated circuits, effective October 1, 1997. Trade secrets are protected under Article 10 of the Chinese Unfair Competition Law.

- **Special IPR Courts.** China has established special IPR courts in 5 provinces and cities: Hainan, Guangdong, Fujian, Beijing, and Shanghai (Kolton, 1996). Specialized courts were set up to ensure that judges well versed in complex IPR law hear these cases. The new Chinese courts have awarded monetary damages to major American corporations, such as Prentice Hall, Harcourt Brace, and World Disney as remedies for copyright violations. Foreign firms have, however, complained that Chinese courts have few mechanisms for enforcing their orders.⁵ Foreign attention has also been focused on Article 62(3) of TRIPS, which requires that all final administrative decisions with respect to IPRs be subject to review, by a judicial or quasi-judicial authority. Currently, most administrative decisions in China are final. China's courts also do not allow the award of damages in IPR infringement cases in which the infringer was unaware that infringement was taking place. This conflicts with Article 45(2) of TRIPS, which allows for damages even if the infringer was unaware that the infringing activity was against the law.
- **IPR Databases.** Monetary aid and personnel training from the German government helped the Chinese government to establish electronic data bases for patents in 1995.
- **Training Programs.** Several major universities, e.g., Beijing University, the People's University, and Wuhan University, have established IPR training programs for judges, lawyers, government IPR officials, and businessmen.
- **Software Title Verification Office.** Opened in Beijing in May 1997, this office is intended to act as a liaison between Chinese CD-ROM manufacturers and American software publishers. The Office is supposed to verify the legitimacy of a software order at a Chinese factory by verifying a contract with the software's original publisher.
- **Internet IPRs.** China has been slow to pass legislation regulating internet copyright and trademark issues. However, in 2000 the Beijing Supreme Court issued a "Guide Opinion on the Trial of Civil Cases Related to IP Rights Caused by the Registration & Use of Domain Names," which acknowledges that registering and using well-known trademarks as domain names constitutes unfair competition. Also, in December 2000, China's Supreme People's Court issued interpretations of China's

⁵ See Seth Faison, "Pirates Show their Colors: Chinese Firms Start to Defy Courts, *International Herald Tribune*, May 18, 1995, p. 17.

IPR laws with respect to their applicability to internet copyright disputes. The October 2001 revision of China's copyright law incorporated numerous new provisions governing on-line copyright protection.

Despite these accomplishments, there have been recurring disputes over IPRs between the United States and China. The two governments initiated ongoing "IPR consultations" in 1986. In May 1991, the U.S. Government opened a Special 301 investigation of IPR protection in China. Six rounds of bilateral negotiations led to a Memorandum of Understanding in January 1992. China agreed to upgrade its patent, copyright, trademark, and trade secret laws and to join major international conventions.

Since 1994, U.S. complaints have generally focused on enforcement of IPRs rather than changes in their content. In 1994, the USTR complained to the Chinese Government that Chinese firms were violating U.S. copyrights on a variety of goods, including computer software, CDs, LDs, and audiocassettes. Chinese media laws restricted the lawful distribution of imported CDs and cassette tapes, yet a large majority of the 75 million CDs produced in China contained copyrighted songs used without permission of their owners. Outdoor markets near major universities, such as in the *Zhongguancun* district near Beijing University, openly sold pirated software programs. The Computer Software Association reported that China purchased just \$1 of software per desktop computer, the lowest rate in the world.⁶

The Chinese government responded to U.S. complaints by shutting down several CD factories producing pirated discs; the United States government responded by threatening to impose trade sanctions beginning February 26, 1995 unless additional enforcement was undertaken. Formal U.S. sanctions would take the form of retaliatory tariffs on Chinese exports, such as cellular telephones, sporting goods, and plastic items.

⁶ Reuters, Jan. 20, 1995.

More importantly, the United States would continue to veto China's application to become a member of the World Trade Organization. China quickly responded by announcing that it would retaliate by imposing tariffs on selected U.S. goods, such as alcohol, cigarettes, video games, and compact discs; suspending joint venture talks with U.S. automobile companies; and possibly purchasing more aircraft from Europe's Airbus Industrie Consortium rather than the U.S.'s Boeing Company.

The conflict was resolved when China agreed to a new bilateral copyright agreement just hours after the U.S. deadline expired. The detailed 30-page text contained numerous important features.

- Export of infringing products prohibited;
- Factories producing infringing CDs to be closed;
- A title verification system to be established to prevent use or sale of audio visual works without the consent of the U.S. copyright owner;
- IPR working groups to be established at the central, provincial, and local levels to coordinate enforcement efforts and to draft and implement regulations and legislation;
- Focused enforcement efforts to be established for IPRs in audio visual works, computer programs, and publications;
- National treatment for civil filing fees and expeditious handling of IPR cases involving foreigners to be implemented; foreigners will have the right to initiate investigations of infringement of their rights, to petition relevant authorities for enforcement action, and to collect and submit evidence towards their complaints;
- No quotas to be established on U.S. audio visual products;
- Record companies to be allowed to market their entire catalog of works subject to censorship concerns;
- All IPR laws, regulations, interpretations, rules, and decrees to be compiled and published by September 1, 1995;

- U.S. IPR-related companies to be allowed to enter into joint ventures for the production and reproduction of their works in China. Initial ventures limited to Shanghai and Guangzhou and expanded to 11 other cities by 2000.⁷

China implemented parts of this agreement by carrying out thousands of raids on retail outlets selling pirated products, upgrading enforcement efforts, and closing seven infringing CD factories. Increased judicial protection of IPRs was highlighted by the Walt Disney Co.'s court judgment against several Chinese companies producing works showing unlicensed Disney characters. Despite these positive measures, approximately 30-45 licensed and unlicensed factories continued to produce infringing CDs; village "viewing rooms" showing pirated LDs thrived; and most computer software sold in retail stores was illegally copied.⁸ The International Federation of the Phonographic Industry claimed that 36 million of the 40 million CDs produced in China during 1995 used copyrighted songs without permission. Fines for violations were also considered inadequate in some prominent cases. For example, a court imposed a fine of only \$2,500 for pirating 200,000 copies of Microsoft's DOS operating system.⁹

In early 1996 the United States government demanded that the Chinese government close the infringing CD factories, tighten customs controls on exports of pirated goods, and provide greater market access to copyrighted U.S. music, films, and software. The United States targeted \$3 billion in Chinese clothing and electronic products for tariffs, while China targeted American movies, TV programs, and CDs for tariffs and announced the suspension of joint venture talks with American pharmaceutical and chemical firms.

⁷ China subsequently signed a similar agreement with the EU. The EU did not conduct formal investigations of Chinese enforcement of IPRs during the 1990s, but did communicate its intent not to allow China into the WTO until it protects intellectual property according to the TRIPS standards.

⁸ In the early 1990s China started to pay royalties to international music publishers when songs were played on the radio, on a concert stage, in television commercials, or in a karaoke bar. Payments to international music publishers totaled only US\$400,000 in 1994.

⁹ See *Far Eastern Economic Review*, May 19, 1994, p. 55.

The dispute was settled on June 17, 1996 when China agreed to close the infringing CD factories and to increase its enforcement efforts against piracy. China increased its enforcement efforts in the months prior to the June agreement and has continued stronger enforcement efforts through 2001. Most of the infringing CD factories have been closed, and stamps used to produce infringing CDs destroyed. Several wholesale centers in Guangdong Province selling pirated CDs have been shut down. Efforts have been made to close “LD viewing rooms.” Increased enforcement efforts by Chinese customs agents have stopped the export of tens of thousands of infringing CDs, LDs, and Video Compact Discs (VCDs) to neighboring economies. Chinese customs officials have participated in several U.S.-organized IPR training sessions.

The increased Chinese IPR enforcement has had some unintended consequences. Chinese crackdowns on piracy of VCDs pushed counterfeiters “offshore” to Macau and Hong Kong beginning in 1997. Macau had no copyright law and the International Federation of Phonographic Industries estimated that each day 500,000 VCDs were smuggled from Macau into China. The boom in pirated VCDs has ignited a huge demand in China for VCD players, with 57 million produced between 1994 and 1999.¹⁰ Chinese officials concede that they have been unable to control VCD piracy, despite having success in controlling piracy of some other goods. While American trade officials are aware of these problems, they have been reluctant to pressure China more heavily in light of its increased IPR enforcement efforts.

III. THE COSTS AND BENEFITS OF STRENGTHENING IPRS IN CHINA

¹⁰ See Seth Faison, “China Turns Blind Eye to Pirated Disks,” *New York Times*, March 28, 1998, D1, D2 and *Zhongguo Dianzi Bao* (China Electronic News), March 15, 2000. Sales of Chinese VCD players have created a powerful domestic interest group, VCD manufacturers, that clearly benefits from VCD piracy.

In this section we briefly review the potential costs and benefits to China of strengthening their intellectual property regime. Though necessarily speculative, this discussion is informed by a growing literature on the relationship between IPRs and economic development.¹¹ The interested reader is referred to more extensive literature surveys (Besen and Raskind 1991, Evenson and Westphal 1997, Maskus and Konan 1994, Primo Braga 1996, and Maskus 2000).

Innovation and creative works may benefit China by adding to the variety of products available, improving the quality and attributes of existing products, and enriching culture. Innovative and creative works differ from most other goods in that they are nonrivalrous, i.e., the inventors may find it prohibitively costly to exclude an imitator from reproducing their creative works. Unless property rights in intellectual innovations are established and their enforcement is facilitated by the rule of law, market participants will have little incentive to compensate creators once the innovation becomes public knowledge. By limiting market access, IPR owners are able to charge a monopoly price above the production cost. This price should be sufficiently high to compensate the inventor for production and creative costs, provide a reasonable rate of profit, and offset the risk burden associated with the creative process. Yet by allowing IPR owners to set monopoly prices for the duration of the intellectual property right, *ex post* efficiency losses result as the IPR restricts availability and increases cost of using existing creative products. Thus a tradeoff exists. Too weak IPR protection discourages creative activity

¹¹ Gould and Gruben (1996) found no relationship between stronger patent laws and economic growth but that a strong relationship between patent strength interacted with a measure of trade liberalization and economic growth. Park and Ginarte (1997) found no relationship between stronger patent laws and economic growth but that strong IPR protection increases physical investment and R&D spending, two basic determinants of economic growth.

and dampens variety of products available while too strong protection provides excessive market power.

As China becomes more integrated in the world economy, intellectual innovations spill over its borders more readily. A large number of studies have isolated numerous determinates of the gains or losses from a country's adoption of stronger IPRs in a global context.¹² They include the country's potential to attract foreign investment; whether the country's firms are capable of developing patentable products and processes; the ability of the country's R&D sector to respond to the new incentives; and the popularity of domestic music, films, art, computer programs, and other literary works. Will China gain from adopting stronger IPRs and enforcing foreign and domestic intellectual property rights more closely? The answer depends on the strength and interaction of several important effects.

Rent Transfer Effect

As a net importer of innovation and technology, China has traditionally maintained low IPR protection to encourage low-cost imitation. Chinese firms regularly counterfeit foreign copyrighted movies, music, and computer software. The technology for high-quality copying is readily available. For example, CD replicators cost only \$2.5 million each in 1997 (down from \$30 million in 1987) and are "small, portable, and easy to use."¹³ Manufacturers of CD replicators in the Netherlands, Germany, and Sweden regularly sold replicators to Chinese firms in the mid-1990s without inquiring whether they were using them to produce CDs containing pirated music. Unauthorized use of

¹² See Taylor (1994), Helpman (1993), Maskus (1990), Grossman and Helpman (1991, 1994), Diwan and Rodrik (1991), Deardorff (1992), Kawaura and La Croix (1995), La Croix and Kawaura (1996), Maskus and Konan (1994), and Chin and Grossman (1991).

¹³ See Robert S. Greenberger and Craig R. Smith, "CD Piracy Flourishes in China, and West Supplies Equipment," *Wall Street Journal*, April 24, 1997, pp. A1, A13.

prominent foreign trademarks on goods such as clothing, watches, and handbags is also widespread. The temptation to infringe on IPRs is fueled by the large gap between the market price of the legitimate product and the cost of production of “close” imitations. The ability to imitate technology in labor-intensive industries enables many Chinese firms to compete effectively in global markets. The percentage of GDP as trade (imports plus exports) has increased from 9.8% in 1978 to 34.42% in 1999 (*China Statistical Yearbook, 1999*, pp. 55, 577-78).

The strengthening of IPR protection essentially raises China’s cost of technology acquisition as local producers are forced to either pay royalties to Western IPR owners or to exit the market. This induces increases in product prices and a transfer of rents and royalties from Chinese consumers and producers to foreign IPR owners (Chin and Grossman 1988, Maskus 1990, Deardorff 1990, Helpman 1993). From China’s perspective, tighter IPRs imply deterioration in its terms of trade. Thus, it is unsurprising to observe the Chinese government trying to “jawbone” foreign patent holders proposing to collect fees deemed “excessive” by the Chinese government. Recent protests by the Chinese government against a plan by six foreign DVD developers to collect additional royalties from China’s DVD equipment manufacturers falls into this category.¹⁴

Innovation effect

Strengthening IPR protection could have a beneficial effect on innovation and R&D in China under some circumstances. Stimulating spending on research and development in China is particularly important due to its low level and concentration in public institutions during the Maoist era (1949-1977). Wu (1995) finds that China’s government has undertaken extensive reform of its state R&D institutions since 1978 and

¹⁴ See story in *Zhonghua Gongshang Shibao* (China Business Times), November 14, 2000.

has encouraged the development of R&D in the new private industrial sector.

Nonetheless, in 1994 China expended just 0.5% of its GNP on R&D, well below the developing country average of 0.64% and significantly less than the developed country average of 2.92% (Wu, 1995). China's R&D as a percentage of GNP increased to .71% by 1998, an increase which may be partially due to stronger IPR institutions as well as the changing structure of the economy (China Statistical Yearbook, 1999, pp. 55, 675).

While a weak IPR regime may encourage imitative R&D in China, thereby building up its overall R&D capacity, it also discourages domestic innovation. The Chinese market is quite sizable. The tastes of consumers and technological constraints of producers likely differ greatly from their counterparts in other innovative nations. By strengthening IPR protection, China may induce greater domestic and global innovation that favors local needs (see Diwan and Rodrik 1991, and Evenson and Westphal 1997).

Why does Chinese law inadequately protect the works of its own inventors and artists? Two different cases must be distinguished. In one set of cases, enforcement of copyrights and patents poses a simple tradeoff: domestic inventive activity is encouraged but at the expense of higher consumer prices and larger transfers of copyright and patent royalties to foreigners. The decision to enforce IPRs in these cases depends on the size and the growth potential of the local industry. If the net result of better IPR enforcement is just higher prices in China and the transfer of royalties overseas, there will be little incentive to enforce these IPRs. In these cases, Chinese authorities may use "enforcement lapses" as bargaining devices to gain a better deal from IPR owners concerning licensing fees and royalties. Chinese reluctance to enforce copyrights in CDs

in late 1995 and early 1996 may have been an example of such behavior—or it may just have been retaliation for U.S. policy towards Taiwan during that period.¹⁵

In a second set of cases, IPR enforcement is likely to be less vigorous, as enforcement generates an additional cost: reduced growth of the stock of knowledge and human capital. Two examples suffice. First, enforcement of IPRs in college textbooks not only increases textbook prices to students and transfers of copyright royalties overseas, but the higher prices also reduce human capital formation by increasing the cost of an education.¹⁶ Second, enforcement of some patents reduces imitative R&D in Chinese industry and thereby reduces the stock of knowledge accumulated via R&D activity. If the switch to innovative activity in a particular industry depends on the accumulated stock of knowledge, then enforcement of foreign patents in China could delay the onset of innovative activity in that industry. On the other hand, if better patent enforcement induces more foreign firms to locate plants and R&D activities in China, then there may be increased spillovers of knowledge to Chinese workers, engineers, and scientists.

Direct foreign investment and technology transfer effect

The effect of IPR protection on FDI is particularly important in our context, as China received US\$40.7 billion in FDI during 2000. Proponents of strengthening IPRs in developing countries frequently cite the benefits it will bring in terms of creating a better environment for technology transfers and inflows of FDI. By enhancing the technological base, technology transfers and FDI contribute to employment and

¹⁵ If such “enforcement lapses” are expected as regular moves in a game to reduce rent transfers, then their usefulness as punishment is impaired.

¹⁶ Less IPR enforcement for foreign educational materials has some drawbacks. Foreign works are less likely to be translated into Chinese, as widespread copying reduces compensation to Chinese translators as well as foreign authors.

economic growth. The argument implies that foreign firms would be more likely to share technological information with Chinese affiliates and licensees when local competitors are legally restrained from infringing on the domestic firm's intellectual property (Sherwood, 1991).

When a firm seeks to protect its reputation for quality, however, it may prefer FDI over either exports or transferring technology to a local vendor when intellectual property protection is low (Horstmann and Markusen 1987). Indeed, in interviews with foreign enterprise managers in China, Maskus and Dougherty (1998) recognize a reluctance to license technologies or otherwise transfer technologies to local operations because of perceived weak IPRs. They identify several defensive measures such as the transfer of only old technologies to joint venture partners, the establishment of strict vertical supply chains to monitor quality and to conceal underlying technologies, and sale to only large established firms with a premium placed on quality, i.e., public enterprises or hospitals. Weak IPR protection could also induce firms to decide not to export goods to China or to produce them in China. For example, during the 1990s international seed producers restricted the export of some seed varieties to Chinese farmers due to poorly specified IPRs for new plant varieties in China.¹⁷

Maskus and Konan (1994) tested the relationship between FDI and IPRs using a cross-sectional sample of 44 countries and found only weak evidence of a positive relationship.¹⁸ Lee and Mansfield (1996) conducted a similar study based on survey data from nearly 100 US firms regarding their perceptions of a country's IPR protection and

¹⁷ China recently upgraded its IPRs protecting plant varieties as part of the package of measures passed to facilitate compliance with TRIPS Agreement.

¹⁸ A wide range of other conditions will play a prominent role in a firm's decision to engage in technology transfer, FDI, or exports. The IPR regime may be a rather minor element in a firm's decision to transfer technology or invest in China.

their investment decisions. Their tests are consistent with the proposition that stronger IPR protection is correlated with a greater volume of FDI. In particular, if 10 percent fewer firms reported a nation as inadequate in IPR protection (versus adequate), Lee and Mansfield would predict an additional inflow of \$140 million in US FDI per year.¹⁹ Given the huge recent FDI flows to China, the impact of stronger IPRs is likely to be somewhat higher in China.²⁰

IV. THE POLITICAL ECONOMY OF IPRS IN CHINA

Chinese policymakers face pressure to strengthen the IPR regime from multiple fronts. Insufficient protection of IPRs has been a perennial source of contention in Sino-US relations as well as a stumbling block in China's bid for WTO membership. Yet, perhaps the most effective pressure originates from within. In this section, we provide an overview of the forces for change and those for stagnation within China.

A. Domestic Forces at Work

Chinese inventors and artists are producing important inventions in some industries, as well as literary, artistic, and musical works. There has been a rapid growth in Chinese patent applications (Table 1). As privatization progresses, many present and former state-

owned enterprises are also seeking means to protect developed or acquired technological innovations (Oksenberg, et al 1996). Consider, for example, dicyclol, a pharmaceutical inhibiting replication of hepatitis B and C viruses and reducing hepatitis manifestations.

¹⁹ Firms in the Lee and Mansfield study were not questioned regarding their opinions of the Chinese IPR system or their activities in China.

²⁰ Lee and Mansfield's regression study adjusted for market size but did not include an interaction variable between market size and IPR protection.

Developed by the Pharmaceutical Institute of the Chinese Academy of Medical Sciences, it has been patented in 13 countries and could be a significant source of income for the Academy—if its patent is enforced. Piracy in pharmaceuticals is widespread in China.

In terms of trademarks and copyrights, Maskus and Dougherty (1998) report that the losses in the Chinese entertainment, publishing, and consumer goods industries likely outweigh those of prominent Western firms like Disney and Microsoft. A few examples may be helpful. Mr. Ling Yan, chairman of the Chinese software company, Sun Tendency, estimates that less than 10 percent of the copies of his Chinese language software program, Chinese Star, are legal. Mr. Wang Shuo, the author of numerous best-selling novels, has encountered thousands of infringing copies of his books in bookstalls in China's major cities. One of China's leading rock-and-roll artists, Mr. Cui Jian, had sold 1.2 million CDs and audio tapes through 1996, but he estimated that over 10 million infringing copies are in circulation.²¹ Hongtashan cigarettes and Maotai liquor have been prominent targets of counterfeiting.²²

Different levels of development in China's coastal provinces and its interior provinces may slow down the transition to stronger IPRs (Maskus and Dougherty 1998). Poorer interior provinces have less interest in strengthening IPRs than richer, more technologically-advanced coastal provinces, as the rent-transfer effects are likely to dominate innovation and technology-transfer effects in the short run in poor provinces, as firms in poor provinces using imitated technologies will have to license the technology and consumers in poor provinces will have to pay higher prices for the firms' products.²³

²¹ See Matt Forney, "Now We Get It," *Far Eastern Economic Review*, 15 February 1996, pp. 40-43.

²² Maskus and Dougherty (1998).

²³ Higher licensing fees could have a variety of effects. They could reduce profits of a fixed number of firms facing inelastic demands; they could put some firms out of business (as higher fixed costs can reduce the optimal number of firms in the market); they could put some firms out of business due to consumer

Even inside richer provinces, the industries capable of producing new technologies may often be small and poorly organized, precisely because of the country's lack of IPR protection. Both factors contribute to slowing down the transition to stronger IPRs.

Given this scenario, foreign pressure to strengthen domestic IPR laws may provide an effective mechanism for overcoming the deadweight losses generated by the interest group logjam (La Croix 1992). The developed country's threat to retaliate against the developing country's exporters will induce the exporters to increase their lobbying activities to strengthen IPRs. In some cases the enhanced coalition pushing for stronger IPRs will be sufficient to override strong, organized domestic lobbies that would suffer losses under a stronger IPR regime. From the perspective of a welfare-maximizing social planner, foreign pressure has, however, a major drawback, as developed countries may push for a transition path to stronger IPRs that is faster than the optimal path for the developing country. We are, therefore, left with the paradox that foreign pressure with respect to IPRs may be privately welcomed by the domestic government yet publicly resisted in order to limit its overreach by foreign countries.

It is also immensely difficult for China to enforce IPRs effectively without a broader, well-established legal infrastructure. Even in the United States, intellectual property is amongst the most sophisticated and rapidly changing areas of law (Oksenburg et al., 1996). With private ownership a somewhat recent phenomenon, laws governing private property of any sort are neither deep nor broad. Ross (1996) observed that the Chinese central government "simply lacks the authority" to end much of the piracy in the Chinese economy. IPR regulations mandated by the central government are often ignored by corrupt local officials who share in the profits from piracy. China has

response to the higher prices; or there could a combination of the last two effects.

established a special court system that is dedicated to resolving IPR disputes. Jenckes (1997) argued that “these new courts do not provide a forum for American businesses seeking to uphold their copyrights.” They often lack appropriate mechanisms for enforcing their decisions. Access to the IPR courts by individuals and small firms is also limited by the requirement that a proportion of the claimed damages be posted as a bond.

With public enforcement efforts limited by China’s antiquated court system, Chinese and foreign firms are organizing into associations which would undertake additional private enforcement, place pressure on government to continue enforcement efforts, and keep the issue before the public. Shanghai’s first anti-piracy association was formed in November 2000 by 43 firms with well-known trademarks.²⁴ The State Bureau of Copyrights has established a national “anti-piracy union.” The union has administrative power to investigate, gather evidence, report activities, and even issue penalties.

Progress on IPR enforcement may, therefore, ultimately proceed at the same slow pace as legal reform in China. Strengthening IPR enforcement is particularly costly in a developing country, as it requires not only the application of scarce legal professionals but also the application of scarce scientific and engineering professionals to this activity.

A key source of pressure on China's government to strengthen IPRs comes from associations in China representing foreign businesses and joint ventures.²⁵ Maskus and Dougherty (1998) survey managers in Chinese high-technology industries, such as information technology and software, chemicals and pharmaceuticals, and biotechnology. Discussed above, they find that foreign enterprise and joint venture managers in China are much more likely to perceive IPR enforcement as a stumbling block than their local

²⁴ Foreign and Chinese software companies have formed a similar organization.

²⁵ We thank a referee for pointing this out.

enterprise counterparts. Direct foreign investment has been a source of economic growth and technology transfer. Thus pressure placed on China's government from foreign business associations is encouraging change.

B. The Political Economy of U.S. Pressure

American pressure on China followed a decade of pressure on other Asian developing countries to reform their IPRs. From the early 1980s the United States has threatened countries with weak IPR laws and institutions through its “Special 301” provisions of U.S. trade law (Konan, et al 1995). Special 301 allows the U.S. Trade Representative to investigate foreign protection of U.S. intellectual property, to negotiate for higher standards of protection, and to retaliate with trade sanctions if negotiations fail.

(Table 2)

As Asian IPR laws approached the standards set in developed countries, the focus of U.S. and European pressure shifted to monitoring enforcement of IPRs, particularly computer software and entertainment copyrights. Table 2 displays estimates compiled by the International Intellectual Property Alliance of piracy rates and lost sales by U.S. firms in Asia during 1995.²⁶ Despite increased enforcement efforts by most Asian countries, it is notable that piracy rates on a broad array of copyrighted products were high not only in China but throughout the region.²⁷

The unilateral pressures from the United States during the 1980s may have been due to the relatively weak set of international treaties coordinating and harmonizing national IPR regimes. The WTO Agreement on Trade-Related Aspects of Intellectual

²⁶ The piracy estimates clearly have severe measurement problems. The survey respondents obviously have incentives to report high rates of piracy to stimulate U.S. government pressure on foreign governments. The rates for business software are likely to be overstated because they do not properly account for customized application software.

²⁷ IIPA data for 1999-2000 indicates piracy rates in China have fallen from 100% to 90% for motion pictures, have remained constant at 99% for entertainment software, and have increased from 54% to 85% for music CDs. See http://www.iipa.com/pdf/2001_Apr30_USTRLOSSESrev.pdf.

Property Rights (TRIPS) represents a dramatic breakthrough in the international regime, as it specifies strong minimum standards for the protection and enforcement of copyrights, patents, trade secrets, trade and service marks, and indicators of geographic appellation. The result is extensive, but not complete, harmonization of national IPR regimes among countries that are parties to the WTO Agreement.²⁸

Future Market for U.S. Firms Selling IPR-Intensive Goods

Chinese economic growth averaged about 7.5 percent between 1978 and 1998, yet average Chinese per capita incomes remain quite low by international standards.²⁹ Per capita income in 1998 was just US\$830, using exchange rate conversion, or US\$3,105, using purchasing power parity conversion. Since incomes using exchange rate conversions are most relevant for purchasing IPR-intensive imports, it is worth asking whether there is sufficient Chinese demand for U.S. firms to enforce against infringing uses of their technologies, trademarked products, or copyrighted products. Income disparities within China may be the source of significant demand. For example, in 1999, the top quintile of urban households had average per capita incomes that were 88 percent higher than urban households in the middle-income quintile (*China Statistical Yearbook*, 2000, pp. 315). Urban residents had average annual per capita incomes that were 165 percent higher than rural residents. Given that there were roughly 60-70 million people in the top quintile of urban households in 1999, this market segment could have provided sufficient demand for IPR-intensive goods to warrant U.S. pressure for stronger IPRs in the 1990s. Current demand must also be coupled with expected large increases in future demands. If China's GDP growth rates continue at the 6.2 percent pace exhibited between 1986 and 1998, then

²⁸ See Primo-Braga (1996) for discussions of the TRIPS agreement.

²⁹ Recent revisions of Chinese national accounts by two economists reduced China's GDP growth rate from 9.2 percent to 6.2 percent between 1986 and 1998 (Maddison 1999) or, alternatively from 10 percent to 7.5 percent between 1978 and 1998 (Young 2000).

average Chinese incomes will double in less than 12 years. Efforts by the United States to strengthen IPR laws and institutions in China may, therefore, be best interpreted as current investments in China's current and growing future demands for IPR-intensive goods.

Changing Comparative Advantage

U.S. government initiatives to protect IPRs in China and the rest of Asia could be driven by changes in U.S. comparative advantage as well as by U.S. trade deficits. We examine changes in the overall trade of IPR-intensive goods by China and the United States and the trade in IPR-intensive goods between the two countries to determine whether there is any evidence for this contention. (Table 3)

Table 3 presents import and export data (millions of dollars) for copyright-protected, patent-protected, and trademark-protected goods. We adopt the classifications used by Keith Maskus (1990, 1993), who selected goods prominent in international disputes over IPRs. Our analysis compares trade figures in 1987, the first year in which China reports 3-digit SITC trade figures, with trade data from 1994, a year in which IPR disputes between the United States and China were simmering, and from the latest year available, 2000. U.S. exports of patent goods to China grew rapidly between 1987 and 2000, but in most sectors the China trade did not grow as fast as overall U.S. exports of patent goods. By contrast, U.S. imports of trademarked goods from China also grew rapidly between 1987 and 2000, but in most sectors the China trade grew faster than overall U.S. imports of trademarked goods. U.S. exports of copyrighted goods also grew between 1987 and 2000 but remain very small and comprise less than 10 percent of Chinese imports of copyrighted goods in 2000. (Table 4)

Table 4 reports simple indexes of revealed comparative advantage in manufacturing (RCAM) of IPR-intensive goods. RCAMs are computed as the ratio of sector exports to sector imports divided by the ratio of total manufacturing exports to total manufacturing imports. An RCAM above unity indicates an industry with an above average export strength relative to overall manufacturing trade, while an RCAM below unity indicates a relatively strong import position for that sector. The United States has a consistently strong comparative advantage in the patented sectors of medical and pharmaceutical products (SITC 541), surveying, measuring, drawing, and gas control instruments (SITC 874), other machinery for special industries (SITC 728), electro-medical and x-ray equipment (SITC 774), and alcohols (SITC 512). This pattern of comparative advantage persists when we calculate sector RCAMs for U.S. trade with China.³⁰ Despite high U.S. RCAMs for many patent goods, Chinese imports of these goods generally remain low, and the U.S. share of this limited trade also remains low. For example, the U.S. share is 13 percent in electro-medical and x-ray equipment, 7 percent in alcohols, and 21 percent in surveying, measuring, drawing, and gas control instruments. Naturally, the United States actively seeks to prevent local infringement of IPRs in these sectors in China. Indeed, the low U.S. trade volume in these sectors may be attributable to weak Chinese IPRs if U.S. firms are concerned about the deterioration of their patents or if infringing Chinese production is substituting for U.S. exports.

In contrast, U.S. imports in trademark-sensitive sectors are heavily focused on China, and the share of Chinese firms in U.S. imports increased in most trademark-sensitive sectors between 1987 and 2000. For example, starting with an 18.5 percent share of U.S. imports in toys and indoor games (SITC 8942) in 1987, China captured

³⁰ The pharmaceutical sector is a notable exception to this pattern.

nearly 83 percent of the U.S. import market by 2000; and China's import share of the U.S. travel goods and handbags sector (SITC 831) grew from 16 percent in 1987 to 50 percent in 2000. There was similar rapid growth in China's import share in the clothing (SITC 84), watches (SITC 885), and furniture sectors (SITC 821). While China has a clear comparative advantage in these sectors, with astronomical RCAMs in clothing (SITC 84) and travel goods and handbags (SITC 831), the intellectual property component of these products (trademarks) tends to be foreign-owned. Indeed, China's strong comparative advantage in these sectors may be partially attributable to relatively weak protection for foreign, especially U.S., trademarks. The U.S. pressure on China to strengthen their IPRs reflects, in part, the desire to protect its intellectual property in these heavily traded trademark-sensitive sectors.

The volume of trade in copyrighted goods seems very small, particularly given the U.S. comparative advantage in many copyrighted goods, such as literary works, computer software, music and films. The low trade flows for copyright-intensive goods in Tables 3 and 4 may, in fact, distort the measured RCAMs as well as provide additional evidence that extensive piracy of these goods is occurring in China.

Related is the American concern over its ballooning overall trade deficit, and the increasingly large bilateral trade deficit with China (Table 5). The merchandise deficit with China reached US\$20 billion in 1994 and US\$84 billion in 2000, about 20 percent of the total U.S. trade deficit.³¹ (Table 5)

³¹ Garbaccio (1995, pp. 6-8) notes that official U.S. figures overstate the U.S.-China bilateral trade deficit by about one-third. Moreover, although U.S.-China trade deficits have increased by 900 percent between 1987 and 1994, the combined deficit with Taiwan, Hong Kong, and China increased by only 40 percent.

The conventional wisdom among trade economists is that bilateral trade deficits are not a concern, as they reflect patterns of comparative advantage and are generally offset by surpluses with other trading partners. Large U.S. deficits with energy producers, e.g. Saudi Arabia, are typically taken for granted. In practice, trade deficits with particular countries have been the subject of special attention from the U.S. President and Congress. Throughout the 1980s and 1990s, for example, the U.S. government pressured the Japanese government to adopt a wide variety of import-promotion policies aimed at balancing trade.

Cox and Ruffin (1998), have recently shown that bilateral trade deficits may matter in a multi-country trade war. In a three country, non-retaliatory environment bashing a deficit country with a small tariff is beneficial for a large country. The bilateral tariff improves the terms of trade of most favored imports (originating from the deficit country) at the expense of least favored imports (from the surplus country). Of course with the tariff the volume of trade falls for favored imports. Hence, an optimal bilateral tariff can be computed. As in Johnson's (1953) classic tariff retaliation model, the Nash equilibrium is comparable to a prisoner's dilemma where all countries lose from a 'country-bashing' trade war. Given that U.S. imports from China are IPR intensive, threats against IPR infringements could be viewed as an attempt to reduce trade deficits with China, and thus improve American terms of trade. IPRs may be the preferred U.S. policy instrument, as they are less vulnerable to retaliation than tariffs.

Infringing Exports

U.S. firms have typically been particularly concerned with infringing uses of their technologies, trademarked products, or copyrighted products when the infringing products are exported to neighboring economies. Exports by Chinese firms of infringing CDs to

Hong Kong in late 1995 were a major trigger for the USTR's investigation of China, as U.S. firms complained that Chinese IPR violations reduced sales by U.S. firms in Hong Kong's lucrative market as well as in mainland China. Why, however, are infringing export activities of particular concern? Isn't a lost sale in Hong Kong equivalent to a lost sale in China?

There are at least four reasons for U.S. firms and the U.S. government to focus on infringing exports. First, pirate operations with economies of scale in production become more viable with infringing exports, as pirates gain additional markets for their products. Limiting IPR pirates to the Chinese markets will hamper movement down their average cost curves. Second, in foreign markets with inelastic demands, even small amounts of additional supply can lead to significant reductions in the price, producing a large loss for U.S. firms on legitimate sales. Third, infringing exports place additional burdens on enforcement in the receiving country, effectively transmitting China's enforcement problems to a second country. The additional burden on police and courts could reduce the overall effectiveness of the importing country's enforcement efforts. Finally, increasing integration of national markets has forced many countries to standardize their IPR policies across markets, as markets become more difficult to isolate. In this environment, the U.S. is less likely to tolerate infringing exports of its firms' products, as this may provide a signal to other countries that such behavior is tolerated.³²

China's behavior with respect to infringing exports was particularly important to the United States in the mid-1990s. Much of China's growth after 1990 was export driven, and U.S. firms did not want to face additional competition in second countries from pirated versions of their own products. Moreover, the U.S. government had pressured many of

³² The U.S. may also maintain a tough stance on flagrant TRIPS violations to set a global example.

China's Asian trading partners to improve their IPR standards and enforcement during the 1980s and 1990s. These countries would be not pleased with dual U.S. standards on domestic piracy and infringing imports.

U.S. Presidential Elections and the Electoral College

The increasing electoral importance of California in U.S. presidential and congressional elections has led U.S. politicians to focus more attention on California's economy and interest groups. California has 54 "winner-take-all" electoral votes in U.S. presidential elections, or 20 percent of the 270 electoral votes required to win the presidency.³³ Several studies have confirmed that federal policies are designed to maximize electoral votes, among other things. For example, Wright (1974) and Wallis (1987) found that spending on New Deal programs was determined by a state's electoral votes as well as its economic conditions.³⁴ Other studies indicate that presidential decisions are biased towards building winning coalitions in large, electorally important states. For example, Grier, McDonald, and Tollison (1995) found that presidential veto decisions were influenced by the floor votes of senators from closely contested large states. In general, presidential candidates have incentives to identify important swing interest groups in closely contested, larger states and reward them with income transfers.

We examine these propositions by examining whether the U.S. government has pushed for stronger IPRs because U.S. IPR-intensive industries are more heavily concentrated in states with more electoral votes. Following our earlier analysis of U.S.-China trade patterns, we adopt the Maskus (1990, 1993) categorization of IPR-intensive

³³ Electoral votes are the sum of the number of representatives in each state and the number of senators (2). States with low populations have a high number of electoral votes per voter, while states with high populations have a lower number of electoral votes per voter.

³⁴ See also Wallis (1999), Wallis (2001), and Fleck (2001) for a discussion of evidence on small-state bias in legislation enacted by the federal government.

industries and use it with the 1997 Economic Census of the United States to determine the number of employees and the share of employment in each state concentrated in copyright-intensive, trademark-intensive, and patent-intensive industries.³⁵ Since some employment data were presented as ranges of values, we calculate three different measures of each employment variable, using the maximum value, the minimum value, and the averages of the bounds of the employment range. The correlations between the levels and shares of IPR-intensive employment with electoral votes, using both aggregate and specific measures of IPR intensity, are reported in Table 6. There is a positive and statistically significant relationship between the number of a state's electoral votes and all four measures of IPR-intensive employment levels. This is, of course, to be expected, as large states often have more employees in most industries due to their large populations. To adjust for this scale effect, we estimate the correlation between employment shares in IPR-intensive industries and electoral votes and find that the correlation is positive but statistically insignificant. We note, however, that California is an outlier, with the largest number of electoral votes and a high percentage of employment in IPR-intensive industries. (Table 6)

Industry influence on government policy is partly determined by its scale and distribution across states but is also a function of the industry's organization for political action. U.S. IPR-intensive industries became increasingly active players in the U.S. political arena as they became more export-oriented in the 1970s and 1980s. In the 1980s, numerous new industry trade associations were formed in the entertainment and computer industries, many with the narrow purpose of lobbying the federal government

³⁵ The Census data used in our analysis are available at <http://www.census.gov/epcd/www/econ97.html>.

to obtain better enforcement of foreign copyrights on entertainment products and computer software.³⁶

V. ENDGAME: CHINA AND THE WORLD TRADE ORGANIZATION

Since the 1996 dispute over copyright enforcement, IPR disputes between China and the United States have cooled down. Some of the change can be attributed to the additional pressure for stronger IPRs generated by high per capita income growth in China and accompanying creative activity by firms and individuals. Part of the change can also be attributed to the conclusion of the 1994 GATT agreement and the resultant formation of the World Trade Organization in 1995. The new GATT agreement held particular promise for China for a number of reasons. First, it offered an opportunity to disable trade sanctions and annual renewals of most-favored-nation status as levers of U.S. policy. Second, its gradual dismantling of the country quotas on textiles (as specified in the Multifibre Trade Agreement) would be particularly beneficial to China's rapidly growing textile industry. Third, it offered the prospect of secure markets for the growing flood of labor-intensive exports coming from a wide variety of China's industrial sectors.³⁷ Finally, it provided the appropriate political leverage for the Chinese government to continue its program to reform and privatize most state enterprises. The stumbling block was that only WTO members could reap these potential gains and China was not a member.

To become a member, China had to negotiate bilateral agreements with 37 WTO members requesting negotiations. An agreement with the United States to establish

³⁶ Pamela Samuelson noted (in a May 1998 personal conversation) that the Hollywood-based entertainment industry has lobbied hard for tough immediate enforcement of IPR laws in Asia, while the Silicon Valley-based computer industry has been more content with gradualist measures. Trade associations in both industries became more active in the 1980s because exports of their IPR-protected just as technological changes markedly reduced the cost of pirating copyrighted products.

³⁷ See Abe and Lee (2001).

permanent normal trade relations was concluded, after many fits and starts, in November 1999 and signed into law by President Clinton in October 2000. An agreement with the European Union quickly followed. Both agreements called for China to adhere to TRIPS immediately upon accession to WTO membership. The WTO approved a multilateral Protocol of Accession for China on September 17, 2001 and approved its membership on November 10, 2001 at the Doha WTO Summit. China formally became a member of the WTO on December 11, 2001.

The siren call of the potential benefits from WTO membership fundamentally changed China's approach to IPRs. WTO membership requires that each member adhere to the strong minimum standards for intellectual property set forth in the 1994 TRIPS Agreement.³⁸ It became quickly apparent that for China to join the WTO, its IPR laws and enforcement practices would have to be strengthened substantially. While strengthening IPR institutions still implied substantial costs for some sectors of the Chinese economy, the tie-in with WTO membership had the effect of significantly ratcheting up the benefits from strengthened IPRs after 1995.³⁹ The reduced conflict over IPRs after 1995 has not occurred because piracy has been curtailed in China—it remains a significant problem. Instead it reflects the recognition by the U.S. government that the Chinese government had changed the priority assigned to strengthening its IPR institutions to meet TRIPS standards.

³⁸ See discussion of TRIPS in Section IV above. The WTO requires its members to adopt the TRIPS Agreement without reservations. After 2005, even the least developed members must fully adopt TRIPS.

³⁹ This argument raises the question of the rationale behind the 1995/1996 copyright disputes between China and the United States. One possible explanation is that the conflict was retaliation for U.S. policies on Taiwan opposed by China. A second explanation is that many of the benefits of WTO membership, i.e., the phase-out of the Multi-Fibre Arrangement, were still years away. By delaying its accession, China would maximize the present value of net benefits from membership. A third explanation is that it took time for the Chinese government to develop and implement new policies with respect to IPRs after the WTO was established in 1995.

The TRIPS Agreement also induced changes in U.S. IPR policy. Prior to TRIPS, there were virtually no international standards governing the strength of IPRs.⁴⁰ Annual “Special 301” reviews of foreign IPRs and threats of sanctions to offending states were the main policy tool used by the U.S. government to protect intellectual property of U.S. citizens and corporations in foreign countries. Since the passage of TRIPS, the United States has continued to utilize Special 301 reviews but has shifted the focus of enforcement efforts towards WTO dispute resolution panels. As of September 2001, the United States had brought nine IPR cases to WTO panels and prevailed (or settled without litigation) in all cases.⁴¹

V. A BROADER VIEW OF IPRS IN CHINA

Despite the rhetorical heat generated by the IPR issue, both countries have acted responsibly with respect to actions taken to resolve IPR differences. Differences have been discussed, and productive agreements have repeatedly been reached. The extent of sanctions threatened by both China and the United States has been limited, and in general the disputes produced only minor disruptions of U.S.-China trade and investment flows during the 1990s. The rhetoric has often been heated because politicians and leaders on both sides do not want to appear to be giving in to the other country’s demands, particularly during election years and leadership transitions. While these political factors have lengthened negotiations, it is important to recognize that they have not prevented the two sides from reaching agreements; the Chinese government from making substantive changes in IPR law and enforcement; and the U.S. government recognizing the limits of Chinese enforcement efforts.

⁴⁰ There were international standards pertaining to other aspects of IPRs, e.g. national treatment.

⁴¹ One IPR case filed by the United States is still in consultations at WTO, and another is being monitored.

The U.S.-China disputes over IPRs must not be viewed in isolation from overall relations. Friction over other issues may have induced China to slow progress on IPR issues to gain leverage in the other disputes. While the 1996 IPR dispute may well have been an attempt to “jawbone” entertainment companies to provide better licensing terms for their products, it may also have been a studied response to the U.S. decision to allow Taiwan’s president to visit the United States.

More broadly, our analysis leads us to conclude that many developing countries, including China, would prefer to set different IPR standards for different industries at different stages of development.⁴² Such differentiation is, however, inconsistent with the laws and institutions of developed countries and with the new world IPR standards set forth in the TRIPS Agreement. With increasing globalization and integration of world markets, the United States and other developed countries have been reluctant to apply differential IPR standards to developing countries due to the potential for infringing exports and for substantial lost sales to their emerging middle classes. The “one-size-fits-all” standard will, however, sometimes produce too much IPR protection too early in some developing countries and is likely to be a source of continued international conflict between developed and developing countries.

⁴² Konan, La Croix, Roumasset and Heinrich (1995) discuss this issue in more detail.

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TABLE 1**CHINA'S PATENT APPLICATION AND GRANTING RATIO**

Year	Domestic Patents			Foreign Patents		
	Applications	Granted	Ratio (%)	Applications	Granted	Ratio (%)
1985	9,411	111	1.2	4,961	27	0.5
1986	13,680	2,671	19.5	4,829	353	7.3
1987	21,663	6,401	29.5	4,414	410	9.3
1988	28,582	11,643	40.7	5,429	627	12.0
1989	27,367	15,480	56.6	5,538	1,649	29.8
1990	36,585	19,304	52.8	4,884	3,284	67.2
1991	45,395	21,178	46.7	4,645	3,438	74.0
1992	61,788	28,311	45.8	5,347	3,164	59.2
1993	68,153	56,882	83.5	9,123	5,245	57.5
1994	67,807	39,777	58.7	9,928	3,520	35.5
1995	68,880	41,248	59.9	14,165	3,816	26.9
1996	82,193	39,721	48.3	20,542	4,059	19.8
1997	90,048	46,379	51.5	24,160	4,613	19.1
1998	96,233	61,378	63.8	25,756	6,511	25.3

Source: 1985-1993 from Wu (1995), p. 239; 1993-1998 from China Patent Office.

TABLE 2**ESTIMATES OF U.S. LOSSES DUE TO ASIAN PIRACY
OF U.S. INTELLECTUAL PROPERTY IN 1996**

Country	Motion Pictures (US\$m)	Piracy Rate (%)	Music CDs (US\$m)	Piracy Rate (%)	Entertainment Software (US\$m)	Piracy Rate (%)
Australia	27	4	3.8	4	na	na
China	124	100	300.0	54	1286.0	99
Hong Kong	10	4	5.0	13	112.2	74
India	58	99	10.0	30	25.8	76
Indonesia	15	98	2.0	9	82.6	80
Japan	108	10	na	na	na	na
Malaysia	42	85	19.0	16	48.0	71
Philippines	26	90	3.0	22	28.0	90
Singapore	18	2	2.4	9	44.0	42
S. Korea	17	15	6.0	18	13.6	66
Taiwan	29	15	5.0	13	105.4	69
Thailand	29	65	5.0	13	73.3	80
Vietnam	5	100	na	na	15.0	99

Source: International Intellectual Property Alliance, web page press release, 1996,
http://www.iipa.com/thml/body_piracy_losses.html.

TABLE 3 (Part I)

**US-CHINA TRADE IN PATENT, TRADE MARK
AND COPYRIGHT GOODS: 1987, 1994, 2000**

<i>Patent Goods</i>		US	US	China	China	US	US
(SITC)	Year	Exports	Imports	Exports	Imports	Exports	Imports
						to China	from China
Alcohols, phenols, etc.	1987	798	660	75	165	12	12
SITC 512	1994	1,451	1,392	208	307	18	17
	2000	1,928	1,840	260	1,604	85	30
Medical/Pharmaceutical	1987	3,348	2,498	421	240	24	34
Products	1994	3,805	2,531	925	217	15	147
SITC 541	2000	5,850	4,924	1,515	255	38	397
Polymerization Products, etc	1987	2,949	1,281	54	1,223	232	3
SITC 583	1994	77	129	323	1,024	0	0
	2000	178	334	7	19	1	2
Other Machinery for Special	1987	2,994	3,761	62	2,762	128	5
Industries	1994	6,450	5,316	306	7,002	327	34
SITC 728	2000	15,300	9,666	552	5,877	359	128
Metalworking Machinery	1987	1,639	3,092	99	979	74	7
SITC 73	1994	3,899	4,756	327	3,125	296	67
	2000	6,167	7,970	720	2,999	204	139
Office Machines	1987	457	2,475	95	110	2	5
SITC 751	1994	799	3,939	554	108	8	302
	2000	996	3,007	1,550	360	15	885
Automatic Data-Processing	1987	9,643	7,314	20	462	148	0
Equipment	1994	17,726	30,615	987	832	159	735
SITC 752	2000	24,803	57,065	10,994	4,516	759	6,540
Electro-Medical & X-ray	1987	1,519	1,452	2	201	26	0
Equipment	1994	2,716	1,917	24	226	57	8
SITC 774	2000	4,406	3,253	113	683	149	50
Electronic Microcircuits	1987	1,623	6,083	1	74	1	0
SITC 7764	1994	15,820	23,383	141	1,544	13	29
	2000	38,680	42,021	2,772	13,300	506	461
Surveying, Measuring,	1987	5,971	3,263	38	777	160	6
Drawing & Gas Control Inst.	1994	11,205	6,036	273	1,461	255	136
SITC 874	2000	21,106	12,883	902	2,982	468	470

TABLE 3 (Part II)

**US-CHINA TRADE IN PATENT, TRADE MARK
AND COPYRIGHT GOODS: 1987, 1994, 2000**

<i>Trade Mark Goods</i> (SITC)	US Year	US Exports	US Imports	China Exports	China Imports	US Exports to China	US Imports from China
Alcoholic Beverages	1987	227	3,554	41	11	0	11
SITC 112	1994	889	4,211	208	308	1	8
	2000	1,147	7,820	123	155	2	10
Perfumery, Cosmetics, etc.	1987	335	546	25	5	0	1
SITC 553	1994	1,715	1,250	106	25	6	0
	2000	2,844	2,375	266	74	15	99
Glassware	1987	180	857	40	17	0	19
SITC 665	1994	560	1,229	174	69	2	49
	2000	865	2,051	498	258	10	211
Motor Vehicle Parts & Accessories	1987	10,925	14,180	1,434	1,836	18	3
SITC 784	1994	21,591	20,708	251	740	44	105
	2000	30,500	29,219	1,129	2,128	124	482
Furniture and parts thereof	1987	828	5,057	177	42	4	79
SITC 821	1994	3,127	8,080	1,493	111	11	851
	2000	4,744	20,604	4,582	170	53	5,264
Travel Goods, Handbags	1987	49	2,045	253	3	0	318
SITC 831	1994	233	3,291	2,365	50	1	1,673
	2000	351	4,778	3,882	33	3	2,396
Clothing	1987	1,143	22,116	5,338	17	1	2,192
SITC 84	1994	5,464	38,643	23,731	622	8	6,666
	2000	8,173	67,115	36,071	1,192	7	8,924
Watches, Movements & Cases	1987	93	1,747	483	456	0	28
SITC 885	1994	276	2,713	1,914	1,090	1	349
	2000	348	3,599	1,831	826	2	678
Toys, Indoor Games, etc.	1987	355	3,976	886	620	0	736
SITC 8942	1994	66	5,255	3,064	119	0	3,627
	2000	541	10,425	5,575	54	4	8,619
<i>Copyright Goods</i>							
Printed Matter	1987	1,562	1,589	23	95	13	3
SITC 892	1994	116	2,329	139	248	0	80
	2000	4,778	3,871	487	538	46	411
Sound Recording Tape, Dises	1987	NA	NA	NA	NA	NA	NA
SITC 8986 & 8987	1994	59	778	31	60	0	9
	2000	3,636	1,446	78	666	55	48

Source: United Nations, *Commodity Trade Statistics* (1987, 1994), Series D. Data for year 2000 was obtained directly from the United Nations.

TABLE 4 (Part I)

**US-CHINA TRADE IN PATENT, TRADE MARK
AND COPYRIGHT GOODS: 1987, 1994, 2000**

<i>Patent Goods</i> (SITC)	Year	US-China Trade (\$millions)	US RCAM	China RCAM	US RCAM (China)
Alcohols, phenols, etc.	1987	24	2.02	0.50	1.70
SITC 512	1994	35	1.40	0.65	4.33
	2000	115	1.84	0.15	19.88
Medical/Pharmaceutical Prod	1987	58	2.24	1.93	1.20
SITC 541	1994	162	2.02	4.07	0.42
	2000	435	2.66	5.37	0.67
Polymerization Products, etc.	1987	235	3.85	0.05	131.37
SITC 583	1994	0	0.80	0.30	-- ^a
	2000	3	1.05	0.33	3.51
Other Machinery for Special Industries	1987	133	1.33	0.02	43.49
SITC 728	1994	361	1.63	0.04	39.35
	2000	487	2.14	0.08	19.68
Metalworking Machinery	1987	81	0.89	0.11	17.96
SITC 73	1994	363	1.10	0.10	18.08
	2000	343	1.45	0.22	10.30
Office Machines	1987	7	0.31	0.95	0.68
SITC 751	1994	310	0.27	4.90	0.11
	2000	900	0.36	3.89	0.12
Automatic Data-Processing Equipment/SITC 752	1987	148	2.20	0.05	-- ^a
	1994	894	0.78	1.13	0.89
	2000	7299	1.02	2.20	0.81
Electro-Medical & X-ray Equipment/SITC 774	1987	26	1.75	0.01	-- ^a
	1994	65	1.90	0.10	29.15
	2000	199	2.50	0.15	20.91
Electronic Microcircuits	1987	1	0.45	0.01	-- ^a
SITC 7764	1994	42	0.91	0.09	1.83
	2000	967	1.20	0.19	7.70
Surveying, Measuring, Drawing & Gas Control Inst.	1987	166	3.06	0.05	45.30
SITC 874	1994	391	2.50	0.18	7.67
	2000	938	3.28	0.27	6.99

Note: ^a Zero U.S. imports from China in indicated sector.

TABLE 4 (Part II)

**US-CHINA TRADE IN PATENT, TRADE MARK
AND COPYRIGHT GOODS: 1987, 1994, 2000**

<i>Trade Mark Goods</i> (SITC)	Year	US-China Trade (millions)	US RCAM	China RCAM	US RCAM (China)
Alocholic Beverages	1987	11	0.11	4.09	0.00
SITC 112	1994	9	0.28	0.65	0.51
	2000	12	0.26	0.72	1.40
Perfumery, Cosmetics, etc.	1987	1	1.02	5.49	0.00
SITC 553	1994	6	1.84	4.05	-- ^a
	2000	114	2.12	3.25	1.06
Glassware	1987	19	0.35	2.58	0.00
SITC 665	1994	51	0.61	2.41	0.17
	2000	221	0.74	1.74	0.33
Motor Vehicle Parts & Accessories	1987	21	1.29	0.86	10.19
SITC 784	1994	149	1.40	0.32	1.71
	2000	606	1.84	0.48	1.81
Furniture and parts thereof	1987	83	0.27	4.63	0.09
SITC 821	1994	862	0.52	12.85	0.05
	2000	5317	0.41	24.35	0.07
Travel Goods, Handbags	1987	318	0.04	92.61	0.00
SITC 831	1994	1674	0.10	45.20	0.00
	2000	2399	0.13	106.26	0.01
Clothing	1987	2193	0.09	344.82	0.00
SITC 84	1994	6674	0.19	36.46	0.00
	2000	8931	0.22	27.33	0.01
Watches, Movements & Cases	1987	28	0.09	1.16	0.00
SITC 885	1994	350	0.14	1.68	0.01
	2000	680	0.17	2.00	0.02
Toys, Indoor Games, etc.	1987	736	0.15	1.57	0.00
SITC 8942	1994	3627	0.02	24.61	0.00
	2000	8623	0.09	93.25	0.00
<i>Copyright Goods</i>					
Printed Matter	1987	16	1.64	0.27	7.36
SITC 892	1994	80	0.07	0.54	0.00
	2000	457	2.18	0.82	0.79
Sound Recording Tape, Discs	1987	na	na	na	na
SITC 8986 & 8987	1994	9	0.10	0.49	0.00
	2000	103	4.44	0.11	8.04

Source: Same as Table 3.

Note: ^a Zero U.S. imports from China in indicated sector.

^b Zero Chinese imports in indicated sector.

TABLE 5

U.S. TRADE DEFICITS WITH CHINA AND THE WORLD: 1980-1999

Year	US Global Trade Deficit	US Exports to China	US Imports from China	US Merchandise Trade Deficit with China	Adjusted US Trade Deficit With China
1978	-33,927	821	324	497	---
1979	-27,568	1,724	592	1,132	---
1980	-25,500	3,754	1,058	2,696	---
1981	-28,023	3,603	1,865	1,737	---
1982	-36,485	2,912	2,284	628	---
1983	-67,102	2,176	2,244	-68	---
1984	-112,492	3,004	3,065	-61	---
1985	-122,173	3,852	3,862	-10	---
1986	-145,081	3,105	4,771	-1,666	---
1987	-159,557	3,488	6,294	-2,805	---
1988	-126,959	5,023	8,512	-3,489	---
1989	-115,245	5,807	11,989	-6,181	-3,400
1990	-109,030	4,807	15,224	-10,417	-7,200
1991	-74,068	6,238	18,855	-12,617	-8,500
1992	-96,106	7,339	25,514	-18,176	-12,600
1993	-132,609	8,619	31,425	-22,806	-15,500
1994	-166,192	9,178	38,573	-29,395	-21,100
1995	-173,560	11,748	45,555	-33,807	-24,000
1996	-191,270	11,978	51,495	-39,520	---
1997	-196,665	12,805	62,552	-49,747	---
1998	-246,854	14,258	71,156	-56,898	---
1999	-345,559	13,118	81,786	-68,668	---

Sources: Overall U.S. Trade Deficit from *2001 Economic Report of the President*, Table B-103; adjusted U.S. trade deficit with China from Fung and Lau (1996), Table 7; U.S. trade with China from Dept. of Commerce, ntdb, 1990-99; Harry Harding (1992) for U.S. trade with China, 1978-1990.

TABLE 6

**CORRELATION BETWEEN IPR-INTENSIVE PRODUCTION AND
ELECTORAL VOTES**

		LEVEL		SHARE	
		r	z-statistic	r	z-statistic
Patent goods	min	0.93***	11.490	0.17	1.189
	max	0.92***	11.009	0.01	0.069
	avg	0.92***	11.009	0.08	0.555
Trademark goods	min	0.64***	5.253	0.04	0.277
	max	0.64***	5.253	0.03	0.208
	avg	0.64***	5.253	0.04	0.277
Copyright goods	min	0.94***	12.042	0.08	0.555
	max	0.94***	12.042	0.03	0.208
	avg	0.94***	12.042	0.05	0.347
IPR goods	min	0.93***	11.490	0.10	0.695
	max	0.93***	11.490	0.04	0.277
	avg	0.93***	11.490	0.07	0.486

Note: *** statistically significant at the 1 percent level