

The International Implications of China's Fledgling Regulatory State: From Product Maker to Rule Maker

DAVID BACH, ABRAHAM L. NEWMAN & STEVEN WEBER

The principal analytical lens through which Western decision makers and commentators have viewed China's rapid rise in the international economy is the country's impact on global market prices. China is already the world's fourth largest trading nation and has the world's biggest labour force, and the prospect of a possible consumer base of over a billion people makes it the most attractive emerging market. Because of this economic might, in both production and consumption, China has begun to shape prices for a large array of goods and services. While analysts disagree about the specifics, no-one fundamentally disputes that this 'China Price' effect exerts considerable influence over current international economic dynamics. This article's main thesis is that the ongoing transformation of the Chinese state is empowering the country's leaders to influence the non-market environment of business as well, and that this route of influence has the potential of being at least as important as changes in relative market prices. A series of domestic institutional reforms have provided Chinese policy makers with the tools to shape the rules and standards that underlie international markets and the terms of competition within them. We show that the particular importance of foreign direct investment (FDI) as a driver of China's economic development amplifies the effects of ongoing domestic institutional capacity building. Having established itself as a global 'product maker', the next round of competition could see China establish itself as a potent 'rule maker' in the global economy. Indeed, evidence is mounting that Chinese policy makers are beginning to deploy their expanding regulatory capabilities to set clear market rules at home and leverage the Chinese market to export them internationally.

While China's already impressive domestic market plays a critical role in this strategy, market size alone is insufficient. We argue that China's ability to influence international market rules depends on policy makers' ability to employ new regulatory capabilities that are the result of a political transformation initiated more than two decades ago. Through a series of administrative reforms, China has constructed a fledgling regulatory state that gives policy makers new

David Bach, Abraham L. Newman & Steven Weber, c/o Instituto de Empresa Business School, Serrano 105, 28006 Madrid, Spain.

tools to impose and enforce market rules. Regulatory states, according to Giandomenico Majone, develop capabilities to set market rules and thereby steer market dynamics through regulatory agencies, commissions and administrative procedures that maintain an arm's-length relationship between state and market.¹ Regulatory states differ from the 'positive states' of a previous era in which governments influenced the economy through open intervention, command and control regulation, and state ownership of major enterprises.

Just as China has gradually reduced its 'positive' direct control over the economy through command and control, it has begun the process of constructing new institutions for economic management and steering consistent with the regulatory state logic. The process is not nearly complete: the Chinese government remains far more actively involved in the domestic economy than governments in advanced industrial democracies. Moreover, the extent of government involvement varies considerably across regions and sectors, ranging from arm's-length steering in new industries, such as software in the Shanghai region, to continued state ownership of large industrial enterprises in the north-east and further inland. However, in keeping with the expectations of earlier research on liberalisation and opening, there is considerable evidence that the Chinese state is not so much retreating from the economy as reconfiguring its role to enforce and direct market competition.²

This shift in governance has the potential to be much more than a domestic reform programme. In a number of sectors, Chinese policy makers can deploy newly created regulatory capabilities in support of internationally oriented competitive strategies. Since 2000, China has aggressively sought to influence international standard setting for a number of cutting-edge technologies. In a knowledge economy, standards increasingly underpin markets, demarcate their boundaries and thereby set the stage for competitive advantage.³ Chinese efforts in this area may thus signal the beginning of a new and potentially significant phase of China's impact on the international economy, one in which the country moves beyond merely making products and instead starts making rules.

China's construction of a regulatory state signals a qualitatively different engagement with the global economy than those of previous emerging powers. More fully than others, China has embraced globalisation. In the 1970s and 1980s, Japan's international economic strategy consisted of exporting as much as possible while keeping the domestic market relatively closed to foreign imports and especially FDI.⁴ Similarly, the policies of import substitution pursued by Brazil and other countries into the 1990s sought to insulate domestic markets from global pressures.⁵ China, by contrast, has embraced the global economy and the opportunities it affords with a vengeance, even though it has done so selectively to shield certain domestic industries.⁶ For a country its size, it is remarkably open to multinational corporations and FDI. Foreign investment is so central to China's economic development strategy that some observers argue that the country is in fact pursuing FDI-led growth, a modification of the 'classic' model of export-led growth prevalent in the Asian tigers.⁷ The openness to foreign investment is a critical reason why even a rudimentary regulatory state has been sufficient to give Chinese officials considerable influence in global markets. The government has made the management of inward FDI a central

pillar of its globally oriented industrial policy.⁸ Influence over foreign firms wishing to invest in China compensates for still limited authority over many local and regional government officials. The importance placed on foreign investment signals that Chinese forays into the field of high-technology policy should not be seen as simple techno-nationalism. The goals could be much greater and more ambitious than autonomy. Rather, armed with new regulatory capabilities, China is developing a sophisticated strategy to manage the rules of global markets to its advantage, a strategy that takes full advantage of both the opportunities afforded by globalisation and the potential power China gains from its huge domestic market.

Like most large, rapidly developing economies, China is a complex case for political economic analysis. Regional disparities in terms of income, investment, economic structure and extent of government ownership, for example, are so large that some analysts caution against referring to 'China' as a single economic entity, putting forth instead the notion of a 'dualistic economy'.⁹ Likewise, on the political side, the ongoing difficulties faced by authorities in Beijing in stamping out government corruption and reigning in certain local and regional leaders casts doubt on the existence of a single 'Chinese government' and even a single 'Chinese state'.¹⁰ Amidst the inevitable complexity, we focus on a particularly significant vector within the ongoing transformation of state and economy. While the scenario we sketch unfolds in just a part of that complex picture, is currently most important in regions that are highly open to global markets, and of course involves only a piece of the overall state apparatus, we claim that it has the potential to be a driving force in Chinese economic policy with important ramifications for the world economy. It is also true that a series of developments could derail the scenario we sketch and we consider several of these.

This article proceeds in five steps. First, we outline the dominant view in much of the literature that the principal mechanism through which China has an impact on the global economy is that of changes in relative market prices. Next, we develop an alternative, political-institutional argument that focuses attention on China's growing ability to challenge the leadership of Western technology innovators in the field of standards. We then analyse the elements of China's standards strategy and sketch its motivation for deploying its new resources in the field of high technology. The international implications of the emerging Chinese regulatory state can be identified in a number of cases involving high-technology standards. While we draw on several examples throughout, we systematically analyse the dynamics in case studies of wireless data encryption standards and radio-frequency identification standards for supply chain management and logistics. We conclude with some reflections on the broader implications of China's regulatory state and some areas for future research.

China the product maker

With more than a billion potential workers and over 100 million middle-class consumers, the Chinese economy inevitably has international significance. Much of the current analysis that attempts to gauge China's impact on global markets focuses on what has become known as 'the China Price'. The China

Price, most simply, refers to the price at which Chinese manufacturers can produce goods competing with their Western counterparts. More fundamentally, this idea captures a broader role that China plays in changing relative prices in world markets. Implicitly or explicitly, there are two versions of the story: China as global supplier, on the one hand, and China as global consumer, on the other. What the China Price argument really suggests is that the price of products produced in China will fall and the price of products consumed by China will rise, and that the critical economic challenges for the rest of the world will be to adapt successfully to these price changes.

On the supply side, Chinese producers have had a radical effect on international markets. Exploiting vast pools of low-wage, high-skilled labour, Chinese companies can produce and sell a surprising variety of goods at cost levels around 30–50 per cent lower than those of many of their Western competitors. Lower environmental standards and other regulation-related costs are part of this equation, but the fundamental advantage that China possesses is simply the supply of production workers willing to work for a monthly wage of US\$120 and engineers who earn roughly US\$2000 a month. Western consumers enjoy the benefits, as low prices help contain inflation and feed consumer spending.¹¹ In the United States, for example, 12 per cent of Chinese exports (US\$15 billion worth of goods) end up on the shelves of WalMart alone.¹²

While the supply-side effects of the China Price were first felt in low-skill industries like textiles and toys, Chinese firms came increasingly to draw on the growing ranks of highly trained engineers to compete in high-end, innovation-driven sectors. Trade statistics reflect this change. High-technology goods are the fastest growing segment of China's exports, rising by 26 per cent in the first quarter of 2005 and accounting for about 29 per cent of total exports.¹³ Chinese entry into the network equipment market offers a concrete case of Chinese technological prowess. Long viewed as one of the most complex pieces of the information technology backbone and dominated by US firms such as Cisco, Chinese firms, including Huawei Technologies, have entered the field aggressively. Huawei has captured 16 per cent of the domestic US market for routers and is ranked second globally for broadband networking equipment, behind Cisco.

The China Price challenge, however, is not limited to production. As China's economy grows, it requires increasing resources. China has become the largest consumer of steel and cement in the world and has overtaken Japan as the second largest consumer of petroleum.¹⁴ Observers note that China has developed a resource-based foreign policy, with Chinese trade representatives searching out energy agreements in Africa, South America and Canada.¹⁵ This resource hunger has had a corresponding effect on world markets for goods ranging from copper to rice, with the price of steel alone rising 20 per cent in the spring of 2004. Japanese auto firms were forced to halt production in several of their factories because of steel shortages attributed to rising Chinese demand.¹⁶

The China Price presents Western manufacturers with a double punch. Many have seen their profit margins on sales pinched at the same time as the cost of their raw material inputs have risen. The important caveat that only a part of China's economy is so far participating in global market competition suggests

that the China Price effect will endure. With southern coastal regions experiencing the first signs of labour shortage, investments are beginning to migrate northwards and inland, where large pools of untapped labour remain.¹⁷ The progressive opening up of previously closed regions means that prices for manufactured goods will remain comparatively low at the same time that increased economic activity will sustain the upward pressure on raw material prices. Therefore, the effects of the China Price are expected to endure and to continue to cause economic distress and dislocation in the West. Yet this is not the whole story. Besides the price challenge, China could pose a second, potentially much more far-reaching challenge in the area of market rules and standards.

From product maker to rule maker

China is not just a large market with a surging demand for raw materials and a gigantic production machine; it is also a state whose industrial and economic policies exert a growing influence in international markets. Since the 1980s, in addition to modernising its economy, the Chinese leadership has also overhauled the political system. As a result, the Chinese state commands considerable resources and capabilities to formulate and implement a globally oriented, national economic policy that is particularly strong in the area of technology development. Through a series of administrative reforms starting in the 1990s, the Chinese government has developed a rudimentary regulatory state that it can draw on to define, coordinate and enforce market rules at home and abroad. China is beginning to show that it will compete not only on price – the measure that matters within markets – but more fundamentally on rules – the infrastructural elements that make up and mark out the boundaries of markets in the first place.¹⁸ The first manifestation of this strategic reorientation can be observed in the field of high-technology standard setting.

The critical role of standards

Advances in information-, communications- and bio-technology and the associated transformation of business strategy have dramatically increased the importance of standard setting for international competitiveness.¹⁹ Having lost their manufacturing edge in the 1980s to Japan, US technology firms in particular have built their competitive advantage around the development and control of key standards and protocols, leaving the manufacturing itself to others.²⁰ By asserting intellectual property over these standards, they have become market makers around them, controlling the pace of innovation and decisively shaping the trajectory of their respective industries. Prominent examples are Intel in the field of personal computers and Cisco Systems in the field of routers and switches. The modular product design underpinning this strategy has enabled Western firms to benefit from 'cross-national production networks', which locate production tasks where they can be accomplished most efficiently. Western firms, then, benefit from low-cost manufacturing at the same time as they profit from the intellectual property embedded in technology standards.²¹

China has benefited significantly from this revolution in technology design and production, capitalising on its cheap labour force to become the world's electronics shop floor. Increasingly, however, China is no longer content to compete merely on manufacturing costs in markets defined by Western technology standards and the firms that own them. Instead, there is growing evidence that Chinese firms, supported by the Chinese government, are beginning to set their own standards in the hope of becoming market makers in their own right. There are two mechanisms by which Chinese firms could translate control over standards into international competitive advantage. Following the Microsoft model, they could sell critical standards-based components for larger technological infrastructures. Licensing fees based on valuable intellectual property would then drive business profits. Chinese firms could also choose to master open standards and offer high value-added services on those standards along the lines of IBM's business model. In either case, it is readily apparent why a Chinese move into the realm of global standards would pose a serious challenge to the foundation of Western competitiveness. Indeed, in light of the critical role of standards, such a move is likely to eclipse the manufacturing challenge posed by Japan in the 1980s.

China's motivation for becoming a global standard setter

China's political leaders are fully aware of the critical role standards play in the global economy. A contemporary saying in Chinese business and government circles captures the critical insight about the logic of competition: 'Third-class companies make products; second-class companies develop technology; first-class companies set standards.'²² The fate of electronics firms in Japan following the USA's response to the challenge from Japanese production has been illustrative. Only those Japanese companies that made successful transitions from competence in manufacturing (no matter how world-beating) to setting and controlling industry-wide standards and protocols have achieved lasting competitive advantage.

Sangbae Kim and Jeffrey Hart describe the new logic of international technology competition succinctly: 'The technological winner is now the one who manages to control de facto market standards while at the same time protecting intellectual property rights.'²³ As the preeminent production location for Western technology firms, China continually experiences the downside of this industrial paradigm. For instance, 90 per cent of all DVD players worldwide are manufactured in China, many of them by Chinese contract manufacturers and a growing number under Chinese brands. Yet the group of US, European, and Japanese companies that controls key DVD patents receives up to one third of the retail price in royalty payments.²⁴ Even when Chinese manufacturers produce DVD players for the domestic Chinese market, they have to send royalties abroad. Chinese authorities view this as a 'patent trap', a situation that enables foreign firms to siphon off billions of dollars from Chinese industrial prowess simply because critical standards are owned by foreign entities. In the words of one Chinese official, 'without independent intellectual property rights, Chinese industry is vulnerable'.²⁵

Chinese authorities have thus identified the promotion of home-grown alternative technology standards as the best way to escape the patent trap. The

government has financially supported and aggressively promoted the development of a Chinese rival to the DVD standard called EVD, or Enhanced Versatile Disc. With standards such as EVD, China is pursuing a clever 'min-max' success strategy. At a minimum, a home-grown technology standard leads to reduced royalty payments, either directly by lowering the market share of foreign standards or indirectly by strengthening the position of Chinese officials in royalty negotiations with foreign patent holders.²⁶ Yet once the standard has successfully been developed domestically, there is no reason not to seek foreign customers for it as well. At a maximum, home-grown technology standards could therefore compete head on with those of foreign competitors and carve out a niche in international markets. In the case of EVD, China achieved only the minimum success – faced with the prospect of losing a potentially significant share of the Chinese market and stimulating the development of a would-be future rival in international markets, foreign patent owners agreed to lower the royalties for DVD players manufactured for the domestic Chinese market from US\$21 to \$12.²⁷ Even this minimal success is a considerable commercial gain for China.

Besides economic considerations, national security concerns are a second motivating factor for the concerted promotion of home-grown technologies. Information technologies, in particular, have become critical for security; they already play a crucial role in modern warfare, for example, and will become even more important in the future.²⁸ As a nation with a proud history of technological leadership through most of recorded history, China is weary of its current dependence on foreign technology, particularly its dependence on US-controlled standards. Indeed, China's significant efforts to build a domestic software industry, and especially its embrace of open source software, are seen by many observers as at least partially motivated by national security concerns.²⁹ There are reports that Chinese officials fear the US government could hold backdoor keys to Windows through which it could sabotage a Chinese communications infrastructure based on Microsoft products.³⁰ A more sober assessment focuses on being cut off from critical technologies in the future, particularly those that the US defence establishment might label 'dual-use'. Against this background, China's investments in Linux, as well as its interest in Java desktop systems, can be seen as prudent efforts to reduce its dependence on a single software architecture and thus a sole supplier located in the US.

In sum, there are compelling economic and national security motivations for the Chinese government to promote the development of home-grown standards as substitutes for foreign control. Granted, many countries could contemplate challenging Western technological leadership based on similar reasoning. Why should we think China will succeed where many others have failed? The reason is that the combination of a regulatory state, a vast market and pronounced openness to foreign investment give China considerably more power in international markets than has been true for other emerging markets in the past.

The fledgling regulatory state

The dual liberalisation of domestic markets and international trade has been associated in the advanced industrial economies with a profound reformulation

of the state's role in the economy. Scholars have labelled this trend the 'rise of the regulatory state'.³¹ Governments that previously relied on some combination of Keynesian demand management and national industrial strategies as the basis for economic policy have increasingly adopted arm's-length regulatory bodies to oversee market competition. Rather than eliminating government influence, government's role has been reformulated and even strengthened.³² A critical element in this transformation has been the creation of a host of new political institutions – regulatory agencies, administrative courts and ombuds commissions – to manage newly liberalised markets.³³ These specialised bodies have the expertise and authority to define and enforce market rules. The rise of the regulatory state has important international implications as jurisdictions with distinct national standards and rules compete with one another to shape corresponding international regulation.³⁴

While this trend has been well documented in Western Europe and the US, we argue that economic liberalisation – driven both by domestic reforms and international commitments associated with membership in the World Trade Organization (WTO) – has fostered the emergence of a regulatory state in China. Obviously, this process remains in its early stages. Liberalisation and economic reform have transformed primarily the coastal regions – the first to be designated Special Economic Zones – and are only slowly reaching the rest of the country. Whereas FDI, growing domestic private investment and relatively free enterprise characterise the most advanced regions, state-owned enterprises continue to account for the bulk of economic activity further inland. Across China, the central government's control over local and regional officials is far from perfect. These caveats notwithstanding, there is clear evidence that the central government has started a process of constructing the regulatory infrastructure to manage markets within its borders, signalling the transition from a state-planned to a state-managed economy.³⁵ The resulting institutional transformation has carried clear and positive implications for China's ability to shape international market governance.³⁶

Through a string of reforms from the early 1990s onwards, the Chinese leadership has orchestrated an administrative restructuring to provide policy makers with the tools to steer rapid economic development through carefully managed engagement with global markets. In order to encourage FDI and promote reform in state-owned enterprises, the state has attempted to establish market mechanisms in the previously planned economy.³⁷ China's public administration has slowly been transformed from a political apparatus serving primarily the patronage needs of the party into a regulatory state capable of setting and enforcing detailed market rules and standards. Critical in this effort were the administrative reforms of 1993, 1998, 2001 and 2003, which infused merit-based recruitment into civil service employment, streamlined ministerial duties and centralised administrative oversight.

The government bureaucracy had long been a patronage resource for the party. However, motivated by the dual needs to tame internal corruption and the desire to have an effective bureaucracy capable of steering economic modernisation, the central government began promoting civil reform in 1993. Initial efforts introduced basic civil service examinations. These were followed in 1998 with initiatives to

integrate merit into recruitment and promotion decisions.³⁸ By the middle of 2000, over 300,000 positions, including those in major government agencies, were open to competitive recruitment. Additionally, many positions must go through a public notice procedure, forcing transparency into the public administration process. Initial reports indicate that these reforms have produced important quality improvements in the civil service, which will significantly influence the ability of the central government to navigate market development.³⁹

At the same time that reforms have attempted to improve the quality of administrative officials, the central government has streamlined economic decision making within the State Council. During the 1998 initiative, the government collapsed over eighty ministries into fewer than thirty. This is particularly significant given that the previous structure provided each industrial sector an individual ministry and gave informal veto power to each.⁴⁰ This privileged sectoral interests within economic policy making, often resulting in deadlock. The administrative reform merged most of the industry ministries into the State Economic and Trade Commission (SETC), centralising economic management. Interestingly, at the same time that it reduced the representation of individual sectors, the government created the Ministry of Information Industry (MII) to spearhead China's entry into the digital economy. As Dali Yang concludes, 'all in all, the post-1998 government restructuring has brought China to the final stage for transforming a government designed for central planning and bureaucratic command to a regulatory state catering to a market economy'.⁴¹

The next wave of reform, starting in 2003, attempted to further consolidate policy coordination. The primary functions of the SETC were split between three institutions designed to oversee macroeconomic policy, state-owned enterprises and international trade. The National Development and Reform Commission (NDRC) consolidated authority for industrial regulation, becoming the primary central government institution responsible for macroeconomic management. The State-owned Assets Supervision and Administration Commission (SASAC) was created to focus further government reform of state-owned enterprises, promoting market mechanisms within firms that remained publicly owned by the central government. This administrative reform removed the highly charged politics of the state-owned sector from general economic planning and focused government oversight of these firms. At the same time, authority over foreign trade issues was centralised in the Ministry of Commerce, ending the overlapping ministerial competencies that had previously existed and promoted fragmentation.⁴²

These internal reforms were spurred in part by Chinese entry into the WTO in late 2001. As part of the accession agreement, the Chinese government pledged to reduce internal market fragmentation and increase transparency. Integral in this effort has been the government's effort to reduce local control over market rules and to subject technology standardisation and market regulation to centralised oversight. Local agencies were bypassed as vertical administrative links were established between provincial agencies and local offices. In a host of regulatory areas from technology standardisation to financial market regulation and environmental protection, the capacity of the central government to manage the economy through, rather than by replacement of, market mechanisms has been strengthened.⁴³

These political–institutional reforms have the potential to transform in particular the environment for technology development. In this area, China has created new bodies for standardisation, regulation and coordination with the private sector. In 2001, the Standards Administration of China (SAC) was launched, which oversees all standards development, issues an annual national standards plan and coordinates activities of other government agencies in the area.⁴⁴ Reflecting its belief that capabilities in the field of standardisation are a critical element of the country's global strategy, the government has committed considerable resources. SAC has nearly 30,000 specialists working on standards development in some 250 technical committees.⁴⁵ Simultaneously, the government is encouraging companies to form associations for the purpose of standardisation. Important technology firms remain government-owned and an extensive web of private–public partnerships weaves firms and regulators together. From a Western perspective, Chinese efforts thus add up to a government-managed standards strategy that relies on active business cooperation.

While many critical components of a regulatory state have been put into place over the last decade, the reform process could still be derailed. Administrative changes in the civil service have focused on the lowest rungs, leaving most upper-level posts in the hands of the party elite. In order to achieve the full technocratic capacity of the ideal Weberian state, these reforms would have to be pushed further.⁴⁶ Similarly, there is the real risk that local authorities could block or co-opt the reform process. During the 1980s, central government efforts to reduce intervention in the economy resulted in the expansion of local power.⁴⁷ Similar concerns have emerged in the recent reform process.⁴⁸ However, the central government has used transparency to fight such resistance, allowing local citizens to use central government rhetoric to pressure local officials. More generally, the central government has maintained considerable economic control despite efforts by local officials to expand their authority at the expense of the central government.⁴⁹ If the reform process proceeds successfully, the central government's ability to develop and implement market rules will grow even further.

Managing global engagement

The attractiveness of the Chinese market, coupled with the country's comparatively high degree of openness to FDI, is the reason why even a regulatory state that is far from complete is beginning to give Chinese policy makers global influence. As George Gilboy notes, 'China allows foreign firms to invest in its domestic market on a scale unprecedented in Asia. Since it launched reforms in 1978, China has taken in US\$500 billion in FDI, ten times the total stock of FDI Japan accumulated between 1945 and 2000.'⁵⁰ In 2003, the country was the world's largest recipient of FDI, and even though it has since lost the top spot to the US, inward FDI continues to grow handsomely.⁵¹ These massive FDI inflows critically contribute to Chinese policy makers' ability to shape global market dynamics. Since beginning the process of economic opening, the Chinese government has created sophisticated tools to steer foreign investment toward industries of strategic importance.⁵² The NDRC and the Ministry of Commerce – the country's two principal regulatory bodies for, respectively, domestic industry

and international trade – periodically publish a foreign investment catalogue that classifies industry segments for investment purposes as ‘encouraged’, ‘restricted’ and ‘prohibited’. Foreign investments in encouraged sectors enjoy special benefits, such as tax reductions or exemptions from duties on imported capital goods. In restricted sectors, any foreign investment must be made through a joint venture in which the Chinese partner holds the controlling stake. In some sectors, foreign investment is prohibited altogether. In all sectors not listed in the catalogue, foreign investment is allowed but investors do not enjoy special benefits.

The foreign investment catalogue enables Chinese policy makers to manage carefully the engagement with the global economy according to strategic priorities. Sectors in which foreign competitors could drive out Chinese players are generally off limits. Those in which China can benefit in particular from technology transfer are encouraged. Changes in the investment catalogue in fact reflect Chinese efforts to upgrade the economy. In 2005, for example, the government removed the ‘encouraged’ status for several segments in the steel, cement and aluminium industries.⁵³ In contrast, it frequently adds segments in the fields of electronics, information technology and telecommunications to the list of ‘encouraged’ investments. Considerable control over massive inward investments and regulatory tools to steer and direct such investments are thus critical for economic policy making.⁵⁴ Indeed, hands-on management of foreign investments compensates for deficiencies in evolving domestic economic management capability.

Considerable control over FDI matters because many Western firms have not just invested in China to cater to the growing ranks of Chinese middle-class consumers.⁵⁵ Rather, they are using China as a manufacturing and increasingly research and development (R&D) base for products targeted at Western customers. If Chinese authorities can exert some control over technology development within its borders by Western multinational corporations, they can shape aspects of foreign market evolution. Trade balances clearly reflect the strategy of inviting foreign firms to produce in China for global markets. Foreign-funded enterprises (FFE) accounted for an impressive 55 per cent of China’s exports in 2003, a figure that is considerably higher than those of the Asian Tigers during their own period of ‘catch-up’. FFEs feature particularly prominently in the field of high technology, accounting for 92 per cent of China’s computer equipment exports and 74 per cent of the country’s electronics and telecommunications exports.⁵⁶

Some analysts argue that the high share of FFE exports exposes China’s economic miracle as nothing but a ‘myth’.⁵⁷ The presence of Western multinational corporations, however, has greatly enhanced the global influence of Chinese regulators. By controlling various terms of market entry, China can influence foreign firms to support its strategic objectives. The case of Siemens is illustrative. Siemens has invested hundreds of millions of dollars to develop jointly China’s home-grown, third-generation mobile communications standard, TD-SCDMA, with the state-owned firm Datang Telecommunications. The standard, which is strongly promoted by MII financially and politically, competes globally with Europe’s WCDMA and US developer Qualcomm’s CDMA 2000.⁵⁸ It is in fact the first official Chinese standard to be accepted by the International Telecommunications Union. According to the Industry Standard, ‘Siemens is betting that TD-SCDMA . . . will prove popular

as Asian carriers upgrade their networks for third-generation mobile services'.⁵⁹ In 2004, the company signed another joint venture with China's leading equipment manufacturer, Huawei Technology, to develop handsets and other equipment based on TD-SCDMA.⁶⁰ In the words of Siemens China's Senior Vice-President, Gao Yan, 'China has become Siemens' global TD-SCDMA R&D center, and we will expand our R&D expertise in China'.⁶¹

It is important to stress that even nominal failure to place a home-grown standard in a global market can be a strategic success for China because of the effect the effort has on bargaining power. (The simple possibility of China aggressively pushing EVD as a DVD-alternative led several Western patent owners to reconsider the extent of royalty fees.) The minimalist view thus portends that indigenous standards act as a bargaining chip for China to counter the patent trap and obtain other political objectives. Perhaps not yet fully capable of developing cutting-edge innovative technology that could conquer world markets, China can nevertheless use the threat of home-grown standards to secure concessions from Western firms and governments. Yet, as the following section shows, even at this early stage the domestic regulatory reforms already have far-reaching international implications.

Mobilising strategic standards in strategic sectors

Since the mid 1990s, the Chinese government has developed the political institutions to set and advance technical standards.⁶² Coordinated by SAC and MII, national Chinese standards have emerged in a range of technology fields, from digital cameras to computer operating systems see (Table 1).⁶³ Apart from previously noted efforts in the area of digital video players, open source software and mobile telephony, China's work in the area of high-definition television (HDTV) and especially its support for the European Galileo satellite system – a rival to the US's Global Positioning System (GPS) – underscore that China is mobilising its resources to influence global standards debates across diverse areas.⁶⁴ To illustrate the various pieces of China's emerging standards strategy, we examine here two highly controversial and significant early standards battles: the cases of WAPI wireless encryption and Radio Frequency Identification (RFID) tags.

A first foray into rule making: wireless encryption

China signalled its growing ability to compete on rules and not just on price in the late 1990s, when it sought to impose WAPI, a home-grown standard for wireless

TABLE 1. Chinese National Technology Standards Initiatives Since 2000

■ Third Generation Mobile Phones	■ Audio Video Coding
■ Digital Television	■ Portable Storage Devices
■ Wireless Area Networks	■ Computer Security Chips
■ Enhanced Versatile Discs	■ Digital Cameras
■ Radio Frequency Identification	■ Fourth Generation Mobile Phones
■ Satellite Positioning Systems	

encryption, on Western industry leaders. Almost any new laptop computer comes with a Wi-Fi chipset for wireless networking. The value of the global market for Wi-Fi networks was US\$2.2 billion in 2002 and industry observers estimate that China's share alone could reach US\$500 million by 2007.⁶⁵ While Wi-Fi technologies have been extremely successful, their principal weakness is security, or rather the lack thereof. Existing encryption systems are imperfect and in any case tend to be disabled on many networks. Against this background, in May 2003 the Chinese government issued two new mandatory standards for wireless encryption. Specifically, it required the inclusion of WAPI technology for both domestically produced and imported equipment with Wi-Fi chipsets. Therefore, anybody wanting to manufacture or sell computers or other Wi-Fi enabled devices in China after December 2003 had to include the WAPI standard.

China's WAPI initiative initially posed a formidable challenge to Western technology companies because WAPI was a home-grown and proprietary Chinese standard that differed significantly from the open international standards promulgated by leading industry bodies, such as the Institute of Electrical and Electronics Engineers (IEEE), and used by Western companies. WAPI algorithms had been developed and were held closely by a group of Chinese firms. Any Western company wanting to produce or sell Wi-Fi enabled technology in China therefore had either to license the WAPI technology or, more likely, to produce it with Chinese firms through joint ventures.

While the industry leader Intel strongly opposed the new standard, leading manufacturers such as Texas Instruments, Philips and Atheros agreed to develop WAPI-based products.⁶⁶ The strategy was also potentially legal under the rules governing the WTO. To prevent precisely these kinds of hold-up strategies, the WTO has adopted rules on Technical Barriers to Trade (TBT) that oblige member states to rely on internationally accepted standards. However, as with so much of international trade law, there is an exception clause. National standards that 'fulfil a legitimate objective', such as national security objectives, can in fact be imposed on foreign producers.⁶⁷ Citing the widespread security vulnerabilities in existing wireless networks, this was precisely the argument China put forward as to why WAPI did not violate TBT rules. While US industry leaders rejected this reasoning, the US government pointedly remained quiet on the possibility of bringing a WTO complaint against China over WAPI. Having invoked a similar national security exception during the anthrax scare in the autumn of 2001, the US government was keen to avoid a WTO precedent on when exactly national security concerns permitted sidestepping international trade agreements.⁶⁸ While not threatening China with a WTO investigation, a formal letter signed by the Secretaries of State and Commerce and the US Trade Representative was sent to China's Vice Premiers in protest.⁶⁹ Complementing such public efforts, the chief executive officer of Intel, Craig Barrett, went personally to Beijing to press his company's case.

After an intense round of bilateral trade negotiations and just a few weeks before the grace period for compliance would have run out, the Chinese government agreed in April 2004 to postpone 'indefinitely' the implementation of WAPI. US officials, in return, showered praise on the strong Sino-American trade relations, eased some trade restrictions and reasserted their support for

imports from China.⁷⁰ This was the end of the first round of the fight. Although some Intel executives saw a decisive victory for Western technology interests, the agreement was a strategic retreat on the part of China.⁷¹ It became clear that the debate was far from over in February 2005, when China withdrew from discussions in the International Standards Organization (ISO) over wireless encryption citing ‘unfair treatment’, without providing any specific details.

The Chinese returned for the next round of this fight in 2006 as a richer and more confident technology player. In early 2006, a group of Chinese companies, including the major players China Telecom, China Mobile, China Unicom, Lenovo and two major Chinese chip designers, established a new alliance to press WAPI.⁷² The Chinese government is actively seeking a coalition of countries to support WAPI at the ISO, in direct competition to the rival 802.11i standard that is developed by the IEEE and in which Intel has invested heavily.⁷³ The outcome of this particular battle is uncertain; the Chinese have at the same time opened discussions about licensing the WAPI standard to non-Chinese technology companies. What is clear is that a combination of shrewd technology policy, private–public partnerships and foreign producers’ dependence on the Chinese market are enabling Chinese officials to use standards issues to take advantage of the opportunities afforded by globalisation and foreign investment.

RFID and the architecture of global supply chains

RFID tags are small silicon chips that can be embedded in products. In contrast to barcodes, which merely identify a product category, RFID tags have the capacity to store a wide range of product item information and may be read remotely via sensors that feed directly into digital communications networks. This technology has far-reaching implications for supply chain management and logistics.⁷⁴ Manufacturers would know the exact location and status of any component in their global production networks, retailers could instantaneously and continuously check inventory levels, customers could proceed through supermarket checkouts without having to empty their carts, and marketers could identify and profile consumers based on tags embedded in their clothes. Because RFID, in contrast to bar codes, can store and transmit more information and do so continuously, they have great potential to alter the terms of market competition. One argument is that, with dramatically augmented supply chain visibility and increasing customer transparency, large retailers could assume an even stronger position. But whatever the precise impact of RFID tags on global markets, what is certain is that those with a commanding knowledge of the underlying standards fundamental to the technology will be well positioned to profit from its multiple industrial applications. While the technology is still in its infancy, the global RFID market was valued at US\$1 billion in 2003 and is projected to grow to US\$3 billion by 2007.⁷⁵

In June 2003, RFID technology received a tremendous boost when WalMart announced that by January 2005 its one hundred top suppliers would be required to use RFID tags. Other major retailers, including Germany’s Metro AG, made similar demands. The initiative was especially important for China as an estimated 70 per cent of WalMart goods contain a component made in China.⁷⁶ Importantly, WalMart made the demand while RFID technology was still relatively immature.

Specifications for Electronic Product Code (EPC), an open standard jointly developed by major Western multinational firms, were still under development, leaving plenty of room for Chinese entry into the standards debate.⁷⁷

In early 2004, SAC created the National RFID Tag Standards Working Group to develop a national Chinese standard. Headed by Edward Zeng, chief executive of Sparkice, the leading Chinese e-commerce company, the goal was to avert getting locked into another foreign standard. Zeng explains the strategic importance of RFID for the country thus: 'China, the global manufacturing hub and one of the largest consumer markets in the world, will see its control over its own national economy and also the global economy eroded, if it fails to have a say in the standards for RFID systems.'⁷⁸

China's initiative quickly triggered heated lobbying efforts from EPC supporters that include leading US and European information technology companies and retailers. The Chinese government sent mixed signals in response. Despite some early conciliatory moves, China has forged ahead and allied itself with a Japanese and Korean effort to develop an Asian alternative, known as Ubiquitous Identification (UID). In late 2004, Zeng explained the important role that China will play in RFID standards regardless of the final technical specification:

Eventually, if China wants to do something, then its market share will define the standard. It is too early to say what the de-facto standard is if China is not taken into account. If China becomes the single largest market, and China plus Japan plus South Korea become 51 per cent of the global wireless market . . . altogether, what does that mean? It means China will become the new standards leader.⁷⁹

During 2005, Chinese officials reasserted their commitment to develop an Asian alternative to the EPC standard. A representative of the MII argued at a conference in Beijing in the middle of the year that 'whatever becomes the China RFID standard will influence global standards and must be interoperable'.⁸⁰ MII delegates, a month later, pulled out of a collaborative RFID workshop with the US National Institute of Standards in Technology. Chinese officials object to the fact that even though the EPC standard is technically open, many of the tools and applications rely on patented technology. Western firms, holding those patents, have signalled that they will demand licensing fees for their use. Additionally, the EPC consortium intends to maintain a registry that will allow participants in supply chains to obtain information about product specification and transport. Chinese firms do not want to cede the value of this information to a Western organisation.⁸¹ An alliance of Chinese firms is therefore developing added value applications for a UID infrastructure and an alternative registry system.⁸²

Complicating the situation further, Sparkice – the Chinese RFID coordinator's firm – has formed a joint venture with the South African iPico to develop its iP-X technology as a competing standard to EPC. iPico has agreed to license a considerable amount of its intellectual property to the joint venture, presenting the possibility of a closed Chinese–South African standard.⁸³ Initial reports suggest that Chinese officials do not anticipate that a home-grown Chinese or regional standard

will usurp EPC globally, but they would be content with a domestic Chinese alternative standard over which they could exert considerable control since this would give them a critical role at the international bargaining table.

The ultimate effect of China's entry into an international technology debate that will lay the foundation for global logistics in the twenty-first century is still ambiguous. The Chinese have maintained a multi-pronged strategy advocating home-grown standards, regional initiatives and cooperation with Western firms. It is still unclear if China hopes to develop its own standard to define the potential multi-billion dollar RFID market, to forge a counterweight to Western dominance, or to merely avoid being 'left out' in critical technology development. These Janus-faced initiatives, intentionally or not, have injected a high level of uncertainty into the international standardisation process. It is precisely this uncertainty that has provided China entry into international negotiations. The international consortium supporting EPC is actively engaging Chinese authorities. In a very real sense, it is a win-win position for the Chinese. Inclusion in Western standardisation efforts integrates the Chinese into cutting-edge technology development, while the pursuit of national and regional efforts offers the prospect of break-through technological advances that could redefine China's international competitive position.

Conclusion

China's impact on the global economy has been viewed predominantly through the prism of price changes in world markets. Yet this focus on prices obscures a potentially more fundamental shift. Markets are transformed equally, if not more dramatically, by strategic behaviour. China's ongoing political transformation and, particularly, the rise of a regulatory state empower policy makers to mobilise the country's market to attain strategic ends. Challenging Western dominance in the field of information technology standards is an obvious first move.

Initial evidence that China's domestic institutional transformation is associated with a growing ability to shape international market rules feeds directly into a new and important scholarly debate about the interaction between the international arena and domestic regulatory change.⁸⁴ There is now a robust literature in the field of political economy about the changing role of the state in liberalising market economies and, particularly, the diffusion of regulation through independent regulatory agencies.⁸⁵ At the same time, scholars of global governance highlight new mechanisms for international cooperation, such as regulatory networks, and new forms of international market regulation.⁸⁶ The case of China illustrates ways of putting these two pieces together. New domestic institutions that transform and enhance the capability of the state to steer market dynamics constitute capabilities to shape international market rules, particularly if the market is as large and lucrative as China's. We need more research on the nexus of domestic and international market governance, and the case of China provides an excellent opportunity to trace the international implications of domestic institutional change.

A second research implication of this study concerns the utility of employing and refining the regulatory state concept outside the advanced industrial economies in which it was developed, most notably the US and Western Europe. While China's regulatory state is still at a rudimentary stage, it already has important

implications for domestic and international market governance. Yet China's set of market regulatory institutions is unlikely to look like or function in exactly the same way as European institutions, just as the latter differ between countries and with the equivalent US institutions. Margaret Pearson argues that China's regulatory state combines institutions such as regulatory agencies with underlying policies and strategies that are more in line with a developmental state model, an argument that is consistent with our findings.⁸⁷ This suggests an important new area for research on different types of regulatory states that builds on – and moves beyond – studies emphasising a US–European dichotomy.⁸⁸

The salience of technology standards for international market competition, which is at the core of this study, warrants closer attention from scholars of political economy. While management scholars have long argued that setting 'winning' standards is a key to firm-level competitive advantage, work in international political economy is only slowly beginning to explore the national political and institutional factors that enable countries to promote their standards worldwide.⁸⁹ If China does, as we argue, pose a serious challenge to Western leadership in the field of technology standards, and if, as seems likely, this challenge will come through the interaction of firm-level activities and deliberate government policies facilitated by new institutions, pressure may quickly mount in Europe, the US, Japan and elsewhere to formulate a countervailing strategy. The equivalent in the 1980s following the manufacturing challenge posed by Japan was the debate over strategic trade and whether a countervailing industrial policy was needed. Yet, if Western policy makers push Chinese officials too hard in support of domestic business interests, Western governments may risk fuelling Chinese techno-nationalism. How exactly government policies employ new regulatory institutions to shape domestic market dynamics in a way that promotes the export of domestic rules and standards will therefore become an important concern for researchers and practitioners alike.

China is already having an extremely significant impact on the global economy. As product maker, it is shaping world market prices across a vast array of goods. Companies across the world are feeling the effect of the China Price and have to adjust simultaneously to falling prices for manufactured goods and rising prices for raw materials. Important as these adjustments are, the challenge may become even more pronounced as China uses its new regulatory capabilities and moves from being merely a product maker to a rule maker.

Notes

The authors would like to thank Miguel Angel Lopera, Craig Pollack, Chiqui Strada, Almudena Villanueva and John Zysman, as well as the editors and reviewers of *New Political Economy*, for very helpful comments and suggestions on previous drafts. Research support from the Carnegie Corporation, the Rockefeller Brothers Fund and the Instituto de Empresa Foundation is gratefully acknowledged.

1. Giandomenico Majone, 'From the Positive to the Regulatory State: Causes and Consequences of Changes in the Mode of Governance', *Journal of Public Policy*, Vol. 17, No. 2 (1997), pp. 39–167.
2. See Steven Vogel, *Freer Markets, More Rules* (Cornell University Press, 1996).
3. Carl Shapiro & Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Harvard Business School Press, 1999).
4. See Chalmers A. Johnson, Laura D'Andrea Tyson & John Zysman, *Politics and Productivity: The Real Story of Why Japan Works* (Ballinger, 1989).

5. For example, Peter Evans, *Embedded Autonomy: States and Industrial Transformation* (Princeton University Press, 1995).
6. Nicholas R. Lardy, *Integrating China into the Global Economy* (Brookings Institution Press, 2002).
7. Chi Wa Yuen, 'The Fifth Asian Dragon: Sources of Growth in Guangdong, 1979–1994', *Contemporary Economic Policy*, Vol. 16, No. 1 (1998), pp. 1–11; Linda F. Y. Ng & Chyau Tuan, 'FDI Promotion Policy in China: Governance and Effectiveness', *The World Economy*, Vol. 24, No. 8 (2001), pp. 1051–75.
8. Eric Thun, 'Industrial Policy, Chinese-Style: FDI, Regulation, and Dreams of National Champions in the Auto Sector', *Journal of East Asian Studies*, Vol. 4, No. 3 (2004), pp. 453–89.
9. Lu Zheng, 'On the Comparative Advantage of Chinese Industries', *Chinese Economy*, Vol. 37, No. 2 (2004), pp. 6–15.
10. Barry J. Naughton & Dali L. Yang, *Holding China Together: Diversity and National Integration in the Post-Deng Era* (Cambridge University Press, 2004).
11. 'The Scourge Returns', *The Economist*, 22 October 2005, p. 18.
12. Ted Fishman, 'The Chinese Century', *The New York Times Magazine*, 4 July 2004.
13. 'Trade Surplus in China Hit \$5.7 Billion in March', *The New York Times*, 12 April 2005, p. C4.
14. Keith Bradsher, 'The Two Faces of China: Giant Global Producer is Expanding Its Role as a Consumer, Creating Threats and Opportunities', *New York Times*, 6 December 2004, p. C1.
15. David Zweig & Bi Jianhai, 'China's Global Hunt for Energy', *Foreign Affairs*, Vol. 84, No. 5 (2005), pp. 25–38.
16. Todd Zaun, 'Nissan to Halt Auto Output at 3 Plants in Japan for 5 Days', *New York Times*, 26 November 2004, p. C5.
17. *Foreign Investment in China, 2004*, U.S.–China Business Council, <http://www.uschina.org/statistics/2005foreigninvestment.html> (accessed 23 October 2006).
18. Karl Polanyi, *The Great Transformation* (Farrar & Rinehart, 1944).
19. Charles R. Morris & Charles H. Ferguson, 'How Architecture Wins Technology Wars', *Harvard Business Review*, Vol. 71, No. 2 (1993), pp. 86–97; and Shapiro & Varian, *Information Rules*.
20. See Michael Borrus & John Zysman, 'Globalization with Borders: The Rise of Wintelism as the Future of Industrial Competition', *Industry and Innovation*, Vol. 4, No. 2 (1997), pp. 141–66, and Jeffrey A. Hart & Sangbae Kim, 'Explaining the Resurgence of U.S. Competitiveness: The Rise of Wintelism', *Information Society*, Vol. 18, No. 1 (2002), pp. 1–13.
21. Borrus & Zysman, 'Globalization with Borders'.
22. As quoted in Richard P. Suttmeier & Yao Xiangkui, 'China's Post-WTO Technology Policy: Standards, Software, and the Changing Nature of Techno-Nationalism', NBR Special Report (2004), p. 1.
23. Sangbae Kim & Jeffrey A. Hart, 'The Global Political Economy of Wintelism', in James M. Rosenau & J. P. Singh (eds), *Information Technology and Global Politics* (State University of New York Press, 2002), p. 143.
24. See Greg Linden, 'China Standard Time: A Study in Strategic Industrial Policy', *Business and Politics*, Vol. 6, No. 3 (2004), online version.
25. As quoted in Suttmeier & Xiangkui, 'China's Post-WTO Technology Policy', p. 11.
26. Linden, 'China Standard Time', p. 15.
27. *Ibid.*, p. 16.
28. See Robert Latham (ed.), *Bombs and Bandwidth: The Emerging Relationship between Information Technology and Security* (New Press, 2003).
29. Suttmeier & Xiangkui, 'China's Post-WTO Technology Policy'.
30. Graham Lea, 'High Prices, False Steps Help Windows Lose to Linux in China', *The Register*, 8 August 2000, <http://www.theregister.co.uk> (accessed 23 October 2006).
31. Giandomenico Majone, 'The Rise of the Regulatory State in Europe', *West European Politics*, Vol. 17, No. 3 (1994), pp. 77–101; Giandomenico Majone, *Regulating Europe* (Routledge, 1996); and Michael Moran, 'Understanding the Regulatory State', *British Journal of Political Science*, Vol. 32, No. 2 (2002), pp. 391–412.
32. See Vogel, *Freer Markets, More Rules*, and Susanne Lütz, 'The Revival of the Nation-State? Stock Exchange Regulation in an Era of Globalized Financial Markets', *Journal of European Public Policy*, Vol. 5, No. 1 (1998), pp. 153–68.
33. See Mark Thatcher, 'Delegation to Independent Regulatory Agencies', *West European Politics*, Vol. 25, No. 1 (2002), pp. 125–47, and David Coen & Adrienne Heritier (eds), *Refining Regulatory Regimes: Utilities in Europe* (Elgar, 2005).

34. Walter Mattli & Tim Büthe, 'Setting International Standards: Technological Rationality or Primacy of Power?', *World Politics*, Vol. 56, No. 1 (2003), pp. 1–42.
35. Anthony Cheung, 'The Politics of Administrative Reforms in Asia: Paradigms and Legacies, Paths and Diversities', *Governance*, Vol. 18, No. 2 (2005), pp. 257–82; Margaret M. Pearson, 'The Business of Governing Business in China: Institutions and Norms of the Emerging Regulatory State', *World Politics*, Vol. 57, No. 2 (2005), pp. 296–322.
36. On the direct link between domestic standards institutions and influence in international standards deliberations, see Mattli & Büthe, 'Setting International Standards'.
37. For an overview of these efforts, see Gregory Chow, 'The Role of Planning in China's Market Economy', *Journal of Chinese Economic and Business Studies*, Vol. 3, No. 3 (2005), pp. 193–203.
38. See Zhiyong Lan, 'The 1998 Administrative Reform in China: Issues, Challenges, and Prospects', *Asian Journal of Public Administration*, Vol. 21, No. 1 (1999), pp. 29–54; and King Tsao & John Abbott Worthley, 'Chinese Public Administration: Change with Continuity during Political and Economic Development', *Public Administration Review*, Vol. 55, No. 2 (1995), pp. 169–74.
39. Dali Yang, *Remaking the Chinese Leviathan: Market Transition and the Politics of Governance in China* (Stanford University Press, 2004), pp. 179–81.
40. See Susan Shirk, *The Political Logic of Economic Reform in China* (University of California Press, 1993).
41. Dali Yang, 'Can the Chinese State Meet its WTO Obligations? Government Reform, Regulatory Capacity, and WTO Membership', *American Asian Review*, Vol. 20, No. 2 (2002), pp. 191–221. See also Yang, *Remaking the Chinese Leviathan*.
42. Yang, *Remaking the Chinese Leviathan*.
43. Yang, 'Can the Chinese State Meet its WTO Obligations?'.
44. For an overview, see 'Raising the Standard: China's Rush to Develop Technology Standards', *The Hoffman Agency Newsletter*, March 2004.
45. See Ann Weeks & Dennis Chen, 'Navigating China's Standards Regime', *China Business Review*, May–June 2003.
46. For a critical review of the early reforms, see Tao-chiu Lam & Hon Chan, 'China's New Civil Service: What the Emperor is Wearing and Why', *Public Administration Review*, Vol. 56, No. 5 (1996), pp. 479–86.
47. Sen Lin, 'A New Pattern of Decentralization in China: the Increase of Provincial Powers in Economic Legislation', *China Information*, Vol. 7, No. 3 (1992–1993), pp. 487–508, and Jean Oi, 'Fiscal Reform and the Economic Foundations of Local State Corporatism in China', *World Politics*, Vol. 45, No. 1 (1992), pp. 99–126.
48. Andrew Mertha, 'China's "soft" Centralization: Shifting Tiao/Kuai Authority Relations since 1998', *China Quarterly*, No. 184 (2005), pp. 791–810.
49. See Naughton & Yang, *Holding China Together*.
50. George J. Gilboy, 'The Myth Behind China's Miracle', *Foreign Affairs*, July/August 2004.
51. 'China tops investment destinations', *China Daily*, 23 September 2004.
52. For the importance of FDI to the Chinese political economy, see Mary Gallagher, 'Reform and Openness: Why China's Economic Reforms have Delayed Democracy', *World Politics*, Vol. 54, No. 3 (2002), pp. 338–72.
53. 'Foreign Investment in China, 2004'.
54. Thun, 'Industrial Policy, Chinese-Style'.
55. Kevin P. Lane & Ian St-Maurice, 'The Chinese Consumer: To Spend or to Save?', *McKinsey Quarterly*, No. 1 (2006), online edition.
56. Gilboy, 'The Myth Behind China's Miracle'.
57. *Ibid.*
58. See 'China's MII allocating 700 mln yuan to TD-SCDMA developers', *AFX European Focus*, 23 August 2004, and 'Can TD-SCDMA make a big splash?', *Business Daily Update*, 29 June 2004.
59. 'Siemens to Invest \$310 Million in Asia for Wireless', *The Industry Standard*, 5 July 2001.
60. 'Siemens, China's Huawei to set up 3G Joint Venture', *Asia Pulse*, 13 February 2004.
61. 'Siemens aims to become leading 3G equipment vendor in China', *Business Daily Update*, 18 May 2004.
62. 'Official Urges China to Develop own standards for IT Sector', *China Online*, 22 June 2000.
63. For an industry perspective on this strategy, see Paul Lee & Victor Long, *Changing China: Will China's Technology Standards Reshape your Industry?* (Deloitte & Touche, 2004).
64. Steve Pain, 'China's influence will shape future technology', *Birmingham Post*, 10 August 2004, p. 18.

65. Carolyn Ong, 'China bids for bigger role in global hi-tech agenda', *South China Morning Post*, 16 March 2004, p. 2.
66. 'WAPI accepted by more chip makers', *SinoCast*, 17 February 2004.
67. See Ichiro Araki, 'China and the Agreement on Technical Barriers to Trade', in Deborah Cass, Brett Williams & George Barker (eds), *China and the World Trading System* (Cambridge University Press, 2003).
68. Keith Bradsher, 'Bayer Agrees to Charge Government a Lower Price for Anthrax Medicine', *The New York Times*, 25 October, 2001, p. B8.
69. Steve Lohr, 'U.S. wants China to yield on its Standard for Wi-Fi', *International Herald Tribune*, 5 March 2004, p. 22.
70. Elizabeth Becker, 'China is praised for preserving global wireless standard', *International Herald Tribune*, 23 April 2004, p. 15.
71. Authors' interview with Intel executive, June 2005.
72. Sumner Lemon, 'WAPI supporters ready a last stand in China', *Network World*, 8 March 2006.
73. Mike Clendenin, 'WAPI battle exposes technology rifts with China', *EE Times*, 17 March 2006.
74. Bharatendu Srivastava, 'Radio Frequency ID Technology: The Next Revolution in SCM', *Business Horizons*, Vol. 47, No. 6 (2004), pp. 60–8, and Gaetano Borriello, 'RFID: Tagging the World', *Communications of the ACM*, Vol. 48, No. 9 (2005), pp. 34–7.
75. Bien Perez, 'RFIDs keep tag on clothes all the way to wardrobe', *South China Morning Post*, 18 March 2003, p. 4.
76. Ted Fishman, *China, Inc.: How the Rise of the Next Superpower Challenges America and the World* (Scribner, 2005).
77. 'China seeking to establish supply chain tracking technology standard', *Xinhua Financial News*, 19 January 2004.
78. 'RFID standard to revolutionize manufacturing', *Financial Times Information*, 3 February 2004.
79. 'Asian partners set the standard', *South China Morning Post*, 26 October 2004, p. 1.
80. Craig Harmon & Leslie Downey, 'RFID: Will China Throw a Monkey Wrench?', *Business Week Online*, 12 September 2005.
81. Harmon & Downey, 'RFID: Will China Throw a Monkey Wrench?'.
82. Harold Clampitt, 'RFID and China', *RFID Journal*, 8 August 2005.
83. Jonathan Collins, 'Sparkice and iPico form Chinese Venture', *RFID Journal*, 14 November 2005.
84. See, for example, David Levi-Faur, 'The Global Diffusion of Regulatory Capitalism', *Annals of the American Academy of Political and Social Science*, Vol. 598, No. 1 (2005), pp. 12–32.
85. For an overview, see Mark Thatcher & Alec Stone Sweet, 'Theory and Practice of Delegation to Non-majoritarian Institutions', *West European Politics*, Vol. 25, No. 1 (2002), pp. 1–22.
86. See Anne-Marie Slaughter, *A New World Order* (Princeton University Press, 2004); Virginia Haufler, *A Public Role for the Private Sector: Industry Self-Regulation in a Global Economy* (Carnegie Endowment for International Peace, 2001); and David Held & Anthony G. McGrew (eds), *Governing Globalization: Power, Authority, and Global Governance* (Polity Press, 2002).
87. Pearson, 'The Business of Governing Business in China'.
88. Examples of this include David Vogel, *National Styles of Regulation: Environmental Policy in Britain and the United States* (Cornell University Press, 1986) and Robert A. Kagan, 'Should Europe Worry about Adversarial Legalism?', *Oxford Journal of Legal Studies*, Vol. 17, No. 2 (1997), pp. 165–83.
89. For the former, see Morris & Ferguson, 'How Architecture Wins Technology Wars'. For the latter, see Mattli & Büthe, 'Setting International Standards'.