

CHINA'S IMPACT ON THE GLOBAL ECONOMY:  
FROM CHINA PRICE TO CHINA STANDARD

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David Bach

Abraham Newman

Steven Weber

Instituto de Empresa Business School  
Serrano 105  
28006, Madrid  
Spain  
david.bach@ie.edu

Georgetown University  
37<sup>th</sup> and O Street, NW  
Washington, DC 20057  
USA  
aben@uclink.berkeley.edu

University of California, Berkeley  
210 Barrows Hall  
Berkeley, CA 94720  
USA  
sweber@socrates.berkeley.edu

**Abstract**

China's entry into the global economy is universally accepted as a defining feature of this new century. Much debate has focused on the impact its economy is having on world market prices, both as producer and consumer. This 'China Price' effect puts tremendous pressure on Western firms. But China is not just competing on price. Supported by new regulatory institutions, it increasingly influences market rules and technology standards as well. Such Chinese efforts pose a direct challenge to Western competitiveness. While Western firms must adapt to the 'China Price', countering the 'China Standard' will require coordination with governments to formulate a countervailing regulatory agenda.

**Keywords**

China, Globalization, Regulatory Institutions, Business-Government Relations, Information Technology, Standards



## INTRODUCTION

China's impressive surge onto the world economic stage is near-universally accepted by academics and leaders in the business and policy communities alike as this decade's defining economic development. Efforts to make sense of this tectonic shift and to gauge its implications for the West have focused principally on China's impact on global market prices. Already the world's fourth largest trading nation, the billion-plus-person economy will command ever-growing market power in years to come, both as consumer and producer of a vast array of goods and services. While nobody can dispute China's impact on market dynamics, we believe that an ongoing domestic transformation is empowering the country to increasingly shape also the non-market environment of global business, the rules that underpin markets. Far from simply a gigantic production machine that consumes vast resources and has the ability to undercut Western prices, China has a growing ability to rewrite the rules of the game in global market competition. Evidence is mounting that China is beginning to deploy its expanding regulatory capabilities to set clear market rules at home and to leverage its vast market to export these rules internationally.

While China's internal market plays an important and necessary role in this strategy, market size alone is insufficient. China's ability to shape international market rules, we argue, depends critically on policymakers' ability to harness the result of a political transformation that has taken place over the last twenty-five years. Through a series of administrative reforms, China has constructed a fledgling regulatory state that is able to impose and enforce market rules.<sup>1</sup> Chinese policymakers can now deploy this administrative apparatus in support of internationally-oriented competitive strategies. Nowhere is this more apparent than in the field of high-technology standards. Since 2000, China has aggressively entered a number of cutting-edge technology debates with the goal of influencing international standard setting. In a knowledge economy, standards increasingly underpin markets and demarcate their boundaries – setting the stage for competitive advantage.<sup>2</sup> Chinese overtures in this area may thus signal the beginning of a new and potentially more significant phase of China's impact on the global economy – one in which the fundamental terms of competition are being contested.

We begin by sketching the standard view in much of the literature that China's challenge to the world economy is best understood in terms of changes in relative prices. We then develop an alternative, institutional argument that focuses on Chinese policymakers' growing ability to strategically engage Western technology innovators – a dynamic we

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<sup>1</sup> On the notion of the 'regulatory state' in which governments steer market dynamics through carefully calibrated administrative capacities and strategies rather than brute command and control see 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. 139-67; and Michael Moran, 'Understanding the Regulatory State', *British Journal of Political Science*, Vol. 32, No. 2 (2002), pp. 391-412.

<sup>2</sup> Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Boston: Harvard Business School Press, 1999).

illustrate through the case of WAPI, a wireless network encryption standard the Chinese government sought to impose on Western producers. Internal political reforms, we argue, increasingly provide the Chinese government with the institutional resources necessary to develop and advance a global standards strategy. The country, we show, has both sufficient motivation and the means to carry out such a strategy. In fact, it is doing just that. While WAPI was a specific technology that posed a direct challenge to US firms and therefore received media attention, other manifestations of China's evolving standards strategy pose much broader challenges to the global economic order and have – paradoxically – gone largely unnoticed. Radio Frequency Identification (RFID) – a technology that will replace barcodes – is a perfect example. By trying to advance a rival Chinese RFID standard, China is not only eyeing lucrative future markets for scanners and software, but also inserting itself in a debate over the technological – and logical – architecture of global supply chains in the 21<sup>st</sup> century. As we argue in conclusion, we may be at the beginning of a new phase of strategic governance, reminiscent of the strategic trade paradigm of the 1980s. In the final section of the paper, we thus consider how Western firms and governments might counter a Chinese move to compete on standards and market rules.

### THE CURRENT FOCUS ON PRICE

Glancing at the business news on any given day, it is hard not to come across reports of China's ascendance in the global economy. With more than one billion potential workers and a middle-class numbering over 100 million, China is shaking up international markets as producer and consumer. The quickly emerging metaphor-of-choice to gauge the effects of this ascendance is 'the China Price.'<sup>3</sup> Identifying 'the China Price' as the scariest words in contemporary US business circles, *Business Week* simply defines it as the price at which Chinese manufacturers can produce the same goods as their US competitors. More fundamentally, it refers to the role 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. A simple version of the argument says that the price of products produced by China will fall and the price of products consumed by China will rise – and that the principal 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 affect on international markets. Exploiting vast pools of low-wage, high-skilled labour, Chinese companies can sell goods in many instances at 30 to 50 percent less than their US competitors. With a huge pool of production workers willing to work for \$120 a month and an army of engineers earning roughly \$2000 a month, Chinese companies have little difficulty competing on cost. US consumers in particular enjoy the benefits as low prices help contain inflation and feed the consumer frenzy of the last few years. Chinese manufacturing has been instrumental to the low-cost, big-box store merchandizing strategy in the US; twelve percent of Chinese exports – \$15 billion worth of goods – wind up on the shelves at WalMart.<sup>4</sup>

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<sup>3</sup> Pete Engardio and Dexter Roberts, 'The China Price', *Business Week*, 6 December 2004, p. 102.

<sup>4</sup> Ted Fishman, 'The Chinese Century', *The New York Times Magazine*, 4 July 2004.

But the China Price effect is not limited to toys and textiles. Chinese firms have increasingly leveraged their growing ranks of highly trained engineers to compete in high-end, innovation driven sectors. High-technology goods occupy a growing share of China's exports and this segment is growing fast. In the first quarter of 2005, China's high-tech exports rose 26 percent and now account for about 29 percent of total exports.<sup>5</sup> China's recent entry into the network gear market is a powerful example. Long viewed as one of the most complex pieces of the IT infrastructure and dominated by Western firms such as Cisco, Chinese firms including Huawei Technologies have entered the field. Cisco CEO John Chambers has remarked, 'We are starting to see a stream of good, very price-competitive competitors, particularly from Asia.'<sup>6</sup> Efforts by Chinese companies to move 'upmarket' are not a big surprise – after all, Chinese managers understand perfectly well the logic of globalization and they understand that competing on labour costs alone is not a strategy for long-term growth. It is just that the move toward market-leading innovation is coming quite a bit faster and more aggressively than many Western firms expected.

And the China Price challenge is not limited to the production side of the equation. As China's economy grows, it requires increasing amounts of natural resources. In the last few years, China has become the world's largest consumer of steel and cement and has overtaken Japan as the second largest consumer of petroleum.<sup>7</sup> It has become a common news item that Chinese trade representatives are making deals in Africa, South America, and even Canada – almost anywhere there are untapped oil reserves. This resource hunger has already had a corresponding shock on world markets for goods ranging from copper to rice, with the price of steel alone rising 60 percent at times over 2004. Ironically, the US trade profile with China has flipped, with the US now exporting goods like oil seeds and wood pulp to China while China exports everything from micro-electronics to computers to the US

The China Price is a double punch to European and American manufacturers. Many have seen their profit margins pinched by Chinese imports at exactly the same time that the cost of their raw material inputs skyrocket. Make no mistake, the China Price effect is real and it is going to continue to affect a broad swath of Western producers. The problem is, the price effect is only the beginning of what China will do to the global economy.

## CHANGING THE RULES OF THE GAME

Running parallel to the China Price phenomenon unfolds a more fundamental transformation of China's role in the global economy. China is not just a vast market with a surging demand for raw materials and a gigantic production machine with global reach; it is also a state whose industrial and economic policies exert a growing influence in

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<sup>5</sup> 'Trade Surplus in China Hit \$5.7 Billion in March', *The New York Times*, 12 April 2005, p. C4.

<sup>6</sup> See Engardio and Roberts, 'The China Price.'

<sup>7</sup> Keith Bradsher, 'The Two Faces of China: Giant Global Producer is Expanding Its Role as a Consumer, Creating Threats and Opportunities', *The New York Times*, 6 December 2004, p. C1.

international markets. Over the last two decades, in addition to modernizing its economy, China has also revamped its political system. As a result, the Chinese state now 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 and market regulation. 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.

### **Muscle flexing over wireless encryption**

Two years ago, the case of WAPI – a Chinese encryption technology for so-called Wi-Fi wireless data networks – demonstrated China's growing ability to compete on rules and not just price. Almost any new laptop computer comes with a Wi-Fi chipset and a rapidly increasing number of other mobile devices ranging from personal digital assistants to mobile phones have it as well. While still in its infancy, rapid Wi-Fi diffusion promises to spawn a host of new digital services dependent on a wireless network of high capacity, always-on connectivity. The global market for Wi-Fi networks was worth \$2.2 billion in 2002 and China's share alone could reach \$500 million by 2007.<sup>8</sup>

Security on Wi-Fi networks is famously sloppy – in fact many devices use no encryption at all and many users who have encryption capabilities in their systems simply turn it off. So the Chinese government had an *a priori* plausible case when, in May 2003, it issued two new mandatory standards that required the WAPI encryption standard for both domestically produced and imported equipment with Wi-Fi chipsets. Put simply, if you wanted to build or sell Wi-Fi enabled systems in China, you needed to build WAPI into your technology as of December 2003.

There was only one problem: the WAPI standard differed significantly from internationally recognised standards that are supported by the principal industry bodies and that Western companies use in their global production. In fact, the WAPI algorithms were held by a group of Chinese companies, several of which are direct competitors of Western firms. And if Intel, the market leader, or anyone else for that matter, wanted to sell Wi-Fi enabled chipsets into the Chinese market, it would need access to those algorithms – access that it could get only by working through the Chinese firms, at a minimum licensing their technology and more likely having to co-produce with them in joint ventures. This was a classic market access hold-up strategy – and it almost worked. A series of critical manufactures including Texas Instruments, Philips, and Atheros agreed to develop WAPI-based products.<sup>9</sup> And the strategy was potentially legal under rules governing the World Trade Organization. The WTO does not allow denial of national treatment to imported products using standards as 'Technical Barriers to Trade' – but the commitment is hedged by a carve-out for standards that 'fulfil a legitimate objective', including national security objectives. The Chinese government naturally put

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<sup>8</sup> Carolyn Ong, 'China bids for bigger role in global hi-tech agenda', *South China Morning Post*, 16 March 2004, p. 2.

<sup>9</sup> 'WAPI Accepted by More Chip Makers', *SinoCast*, 17 February 2004.

forward the national security argument and while US IT industry spokespeople rejected this out of hand, the US government pointedly did not suggest that it would pursue action against WAPI through the WTO. Washington nevertheless brought some heavy political pressure to bear, sending a formal letter signed by the Secretaries of State and Commerce and the US Trade Representative to China's Vice Premiers.<sup>10</sup> Complementing such public efforts, Intel CEO Craig Barrett personally went to Beijing to press his company's case.

In April 2004, just a few weeks before the grace period for compliance would have run out on June 1, the Chinese government conceded to postpone its implementation of the WAPI standard after an intense round of trade negotiations. In return, the US government showered praise on bilateral trade relations, eased some trade restrictions, and promised to continue strong US imports of Chinese goods.<sup>11</sup> A decisive victory for Western technology interests? More likely, a strategic retreat on the part of China. Although the country's Ministry of Information Industry (MII), which oversees the telecommunications sector, stated that the WAPI postponement was indefinite, it also made explicit that China had no intention of giving up on its plan to set its own standards for wireless encryption, along with other technologies it deemed essential. Meanwhile there have been scattered reports of some Western companies hedging their bets and considering cooperation with the Chinese on wireless encryption.<sup>12</sup>

### **A new China challenge**

The dynamics displayed in the WAPI case are not an exceptional, one-time event. Rather, they signal the advent of a new chapter in China's challenge to Western producers and governments. China's ongoing political transformation and the rapid development of its regulatory apparatus increasingly put the country in a position to mobilise its vast market potential in order to tilt international technology standards in its favour. This amounts to a direct challenge to the source of America's and Europe's competitive advantage. In the next round of global competition, China will systematically and strategically employ its economic and political power to shape the rules of the game in international markets. In this respect, the challenge it poses to Western firms is reminiscent of Japan's in the 1980s. Yet China's impact on the logic of international market competition could easily eclipse that of Japan. For one, China's market potential is vastly greater and the costs of being shut out of China's market for non-compliance with government policy is simply too great for many Western businesses. As seen, Texas Instruments, Philips, and others quickly broke ranks with industry-leader Intel when market access was at stake in the WAPI case.

More importantly, since Japan's offensive, advances in information-, communications-, and bio-technology and a transformation of business strategy have elevated the

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<sup>10</sup> Steve Lohr, 'US wants China to yield on its Standard for Wi-Fi', *International Herald Tribune*, 5 March 2004, p. 22.

<sup>11</sup> Elizabeth Becker, 'China is praised for preserving global wireless standard', *International Herald Tribune*, 23 April 2004, p. 15.

<sup>12</sup> See, for example, American National Standards Institute, 'Intellectual Property Rights Policies in Standards Development Organizations and the Impact on Trade Issues with the People's Republic of China', 10 June 2004.

importance of standard setting for international competitiveness.<sup>13</sup> During the 1980s, manufacturing know-how was the key to Japan's competitive advantage. In the 1990s, American business responded with a 'Wintelism' strategy of securing competitive advantage through control over key standards and protocols and outsourcing manufacturing.<sup>14</sup> Relying on 'open-but-owned' standards, companies such as Microsoft and Intel rejected the closed standard model long employed by firms including IBM and Apple which necessitated extensive in-house capacity at all points in the supply-chain. Instead, Wintelism firms licensed critical standards, making interfaces available to other firms who in turn produced low-margin return components. International production networks were constructed whereby low-margin processes were outsourced. China became a principal beneficiary of this strategy, as it has become the world's electronics shop floor. Paradoxically, however, the very success of Wintelism makes Western business vulnerable. Given its manufacturing edge captured by the notion of the China Price, an aggressive Chinese move into the realm of global standards and market rules would indeed pose a serious challenge to the foundations of Western competitiveness. But does China have sufficient motivation and, more importantly, does it have the means to get into the global standards game?

### **China's motive: money, power, and pride**

China's motive to becoming a global player in the field of standard setting and standard projection has commercial, security, and cultural roots. China is fully aware of the critical role standards play in the global economy. As a contemporary saying in Chinese business and government circle goes: 'Third-class companies make products; second-class companies develop technology; first-class companies set standards.'<sup>15</sup> The experience of Japan and America's response to the Japanese production challenge has been an important lesson. Only those Japanese companies that successfully transitioned from pure manufacturing competency to setting and controlling industry-wide standards have been able to build lasting competitive advantage. 'The technological winner is now the one who manages to control de facto market standards while at the same time protecting intellectual property rights,' argue Sangbae Kim and Jeffrey Hart.<sup>16</sup> As the world's electronics shop floor, China experiences the downside of this new industrial paradigm every day. The country now accounts for 90 percent of all DVD players manufactured worldwide. Yet Western companies that control key DVD patents receive up to one third of the retail price through royalty payments.<sup>17</sup> Even when Chinese manufacturers produce

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<sup>13</sup> Charles R. Morris and Charles H. Ferguson, 'How Architecture Wins Technology Wars', *Harvard Business Review*, Vol. 71, No. 2 (1993); and Shapiro and Varian, *Information Rules*.

<sup>14</sup> See Michael Borrus and John Zysman, 'Globalization with Borders: The Rise of Wintelism as the Future of Industrial Competition', *Industry and Innovation*, Vol. 4, No. 2 (1997); and Jeffrey A. Hart and Sangbae Kim, 'Explaining the Resurgence of US Competitiveness: The Rise of Wintelism', *Information Society*, Vol. 18, No. 1 (2002), pp. 1-13.

<sup>15</sup> As quoted in Richard P. Suttmeier and Yao Xiangkui, 'China's Post-WTO Technology Policy: Standards, Software, and the Changing Nature of Techno-Nationalism', *NBR Special Report* (2004), p. 1.

<sup>16</sup> Sangbae Kim and Jeffrey A. Hart, 'The Global Political Economy of Wintelism', in James M. Rosenau and J. P. Singh, *Information Technology and Global Politics* (Albany: State University of New York Press, 2002), p. 143.

<sup>17</sup> See Greg Linden, 'China Standard Time: A Study in Strategic Industrial Policy', *Business and Politics*, Vol. 6, No. 3 (2004).

DVD players for the domestic Chinese market, they have to send royalties abroad. This perceived 'patent trap' has been a principal motivator for China's establishment of the 'Enhanced Versatile Disc' (EVD) standard as a DVD rival. In the words of one Chinese official: 'Without independent intellectual property rights Chinese industry is vulnerable.'<sup>18</sup>

In addition to commercial imperatives, national security considerations are clearly a motivating factor as well. A nation with a proud history of technological leadership in ancient times is weary of its current dependence on foreign technology and particularly its dependence on US technology. In addition to the debate over the WAPI standard, China's embrace of open source software is seen by many observers as at least partially motivated by national security concerns. A reversed conspiracy theory argument claims that Chinese officials fear that the US government holds backdoor keys to Windows that could effectively sabotage any infrastructure based on Microsoft products. A more sober assessment focuses on China's concern to be cut off from critical technology in the future. China's investments in Linux, as well as its interest in Java desktop systems, are efforts to reduce its dependence on a single software architecture and thus a sole supplier.

Cultural pride is the final motivating factor that reinforces commercial and national security considerations. China's pride in its ability to outperform the rest of the world in electronics manufacturing, for example, is overshadowed by the 'patent trap' that sends a sizeable share of profits overseas. Furthermore, as the world's most populous country, China can reasonably argue that the preferences of its citizens ought to find greater reflection in technology product- and interface-design. Language is an obvious concern. Much of the Chinese government's initial investment in open source software, for instance, went toward supporting versions of Linux in Mandarin and Cantonese. Pride in its language and culture alone probably would not have been sufficient to motivate China's recent offensive in the technology field. Yet these 'hard' commercial and security interests blend with cultural pride to make for a compelling motivation to take on the existing international status quo.

### **China's method: regulatory capacity and market leverage**

While China's motivation for seeking a greater role in international technology standard setting is straightforward, many observers doubt it can succeed. There is a common presumption that any defiance of global market standards as they currently exist inevitably fails. An Intel executive, for example, predicted that 'by mandating a standard that is not compatible with international standards, China is taking an approach that has historically proven ineffective.'<sup>19</sup> Yet unwavering belief in the power of existing standards to check Chinese standards ambition may be misplaced. China combines the vast market potential of 1.3 billion people with a rapidly developing institutional apparatus for market steering. China has undergone a political institutional transformation and increasingly possesses resources and capabilities to leverage its market potential internationally. Indeed, its very openness to global markets and foreign

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<sup>18</sup> As quoted in Suttmeier and Xiangkui, 'China's Post-WTO Technology Policy', p. 11.

<sup>19</sup> Ian King, 'Intel to halt sales of chip in China', *The Miami Herald*, 11 March 2004, p. C4.

investment makes China's standards offensive viable. Having previously assessed China's commercial, security, and cultural motivation for exerting greater influence over technology standards, let us now turn to its method.

In a string of reforms beginning in the early 1980s, the Chinese leadership has orchestrated an administrative restructuring to provide policymakers with the tools to steer rapid economic development and engagement with the global economy. The Chinese administration has slowly been transformed from a political apparatus serving primarily the patronage needs of the party into a fledgling regulatory state capable of steering market dynamics through the establishment and enforcement of detailed market rules and standards. Critical in this effort were the administrative reforms of 1983, 1993, and 1998, which infused merit-based recruitment into civil service employment, streamlined ministerial duties, and centralised administrative oversight.<sup>20</sup> During this period, the government collapsed over eighty ministries into less than thirty. This is particularly significant given that the previous structure provided each industrial sector an individual ministry (i.e. for coal, machine-building, aviation...etc.) and gave informal veto power to each.<sup>21</sup> The administrative reform merged most of the industry ministries into the State Economic and Trade Commission, centralizing economic management. Interestingly, at the same time that it reduced the representation of individual sectors, the government created the MII to spearhead China's entry into the digital economy. '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,' argues Dali Yang, a scholar of the Chinese administrative state.<sup>22</sup>

These internal reforms have been bolstered 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 elevate standardization and product management issues 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 standardization to environmental protection, central government capacity to manage the economy has been strengthened.<sup>23</sup>

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<sup>20</sup> 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 Tsao, King and 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.

<sup>21</sup> See Susan Shirk, *The Political Logic of Economic Reform in China* (Berkeley: University of California Press, 1993).

<sup>22</sup> Yang, Dali, 'Can the Chinese State Meet its WTO Obligations? Government Reform, Regulatory Capacity, and WTO Membership', *American Asian Review*, Vol. 20, No. 2 (2002).

<sup>23</sup> See Yang, 'Can the Chinese State Meet its WTO Obligations.' For a somewhat different view, see Andrew Mertha, 'China's 'soft' Centralization: Shifting Tiao/Kuai Authority Relations since 1998', *China Quarterly* (forthcoming).

Administrative reform offers China the political resources to shape standards policy internationally.<sup>24</sup> The three principal elements of China's method are strategic planning, coordination, and international leverage. In all of these, the country appears to have learned important lessons from Japan. Japan's planners in the Ministry for International Trade and Industry (MITI) and other parts of the government famously targeted industries for rapid growth and export promotion.<sup>25</sup> Similarly, Chinese government agencies are playing an increasingly important role in the targeting of resources on strategically important technology projects. Software is a good example. The State Council, the country's highest executive organ, recently adopted a comprehensive plan to boost China's software industry.<sup>26</sup> Some of the incentives adopted are quite considerable – new software ventures do not have to pay taxes for the first two years, for example, and have their regular tax burden halved over the three following years.<sup>27</sup>

A second element is coordination. Chinese authorities have greatly augmented their ability to steer the technology field through their own purchases and through regulatory institutions and private-public partnerships. In the 1980s and 1990s, incompatibility and wasteful redundancy characterised China's IT procurement as local, regional, and national bureaucrats purchased without coordination. Such purchasing has been streamlined through the above-mentioned administrative reforms. Moreover, the country's ambitious e-government offensive and its goal to market the 2008 Beijing Olympics as the 'digital Olympics' have considerably enhanced central procurement and thus given policymakers new tools to steer the industry.<sup>28</sup> The effects of central purchasing power could soon be felt by Microsoft and other Western software firms, as a 2003 State Council decision requires all ministries to only purchase software produced in China during the next round of upgrades.<sup>29</sup>

China has also created new bodies for standardization, regulation, and coordination with the private sector. In 2001, it launched the Standards Administration of China (SAC), which oversees all standards development, issues an annual national standards plan, and coordinates activities of other government agencies in the area.<sup>30</sup> Reflecting the government's belief that capabilities in the field of standardization are a critical element of the country's global strategy, it has committed considerable resources. SAC has nearly 30,000 specialists working on standards development in roughly 250 technical committees.<sup>31</sup> Simultaneously, the government is encouraging companies to form

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<sup>24</sup> For the importance of domestic standards institutions for international outcomes, see Walter Mattli, Walter and Tim Büthe, 'Setting International Standards: Technological Rationality or Primacy of Power?', *World Politics*, Vol. 56, No. 1 (2003), pp. 1-42.

<sup>25</sup> Chalmers A. Johnson, *Miti and the Japanese Miracle: The Growth of Industrial Policy 1925-1975* (Stanford: Stanford University Press, 1982).

<sup>26</sup> Suttmeier and Xiangkui, 'China's Post-WTO Technology Policy', p. 3.

<sup>27</sup> 'China to introduce favorable policies for software/integrated circuit firms', *AFX – Asia*, 13 July 2000.

<sup>28</sup> Suttmeier and Xiangkui, 'China's Post-WTO Technology Policy', p. 34.

<sup>29</sup> 'China to order government departments to use locally developed software', *AFX – Asia*, 15 August 2003.

<sup>30</sup> For an overview, see 'Raising the Standard: China's Rush to Develop Technology Standards', *The Hoffman Agency Newsletter*, March 2004.

<sup>31</sup> See Ann Weeks and Dennis Chen, 'Navigating China's Standards Regime', *China Business Review*, May-June 2003.

associations for the purpose of standardization. Even when the private sector takes the lead, however, the Chinese state is omnipresent. Many technology firms are 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-driven industrial strategy that relies on active business cooperation.

The most important element of China's method, finally, is leveraging these new resources and capabilities through its vast market potential. Lured by the potential of a market counting 1.3 billion customers and staggering growth rates, Western multinationals have flocked to China. This has been aided by the country's extraordinary openness to foreign investment, particularly when compared to its neighbour Japan. As George J. 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 \$500 billion in FDI, ten times the total stock of FDI Japan accumulated between 1945 and 2000.'<sup>32</sup> In 2003, the country was the world's largest recipient of FDI.<sup>33</sup> Permitting massive foreign investment has been a conscious part of China's global strategy and is reflected in its trade balance: foreign-funded enterprises (FFE) accounted for an impressive 55 percent of China's exports in 2003, a figure that is considerably higher than those of the Asian Tigers during their own catch-up. FFEs feature particularly prominently in the high-technology field, accounting for 92 percent of China's computer equipment exports and 74 percent of the country's electronics and telecom exports.<sup>34</sup>

Some analysts argue that the high share of FFE exports exposes China's economic miracle as nothing but a 'myth' and argue that Europe and America, consequently, have little to worry about.<sup>35</sup> The opposite is true. The presence of Western multinationals has greatly enhanced the global influence of Chinese regulators. By controlling various terms of market entry, China can get foreign multinationals to support its strategic objectives. China has long made technology transfer an investment condition, usually by mandating joint ventures with domestic firms. Foreign multinationals' investments in China-based research and development capabilities are particularly critical. For Western firms, such R&D investments follow a dual logic: they permit tapping into a comparatively cheap pool of highly-educated engineers and scientists while enhancing the proximity of product development to consumers and authorities in the world's most exciting market.

This R&D presence gives China's government extensive international leverage. The Chinese state shapes technology development, even within labs owned by Western companies. Since these companies often use labs in China to develop technologies for world markets, Western R&D presence gives Chinese officials global reach. Mere theory? Consider the case of Siemens, which has invested hundreds of millions to jointly develop China's home-grown third-generation mobile communications standard TD-SCDMA with state-owned Datang Telecommunications. The standard, which is strongly promoted by MII financially and politically, competes globally with Europe's WCDMA

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<sup>32</sup> George J. Gilboy, 'The Myth Behind China's Miracle', *Foreign Affairs* July/August 2004.

<sup>33</sup> 'China tops investment destinations', *China Daily*, 23 September 2004.

<sup>34</sup> Gilboy, 'The Myth Behind China's Miracle.'

<sup>35</sup> Gilboy, 'The Myth Behind China's Miracle.'

and US developer Qualcomm's CDMA 2000.<sup>36</sup> It is in fact the first official Chinese standard to be accepted by the International Telecommunications Union. 'Siemens is betting that TD-SCDMA (...) will prove popular as Asian carriers upgrade their networks for third-generation mobile services.'<sup>37</sup> The company recently signed another joint venture with China's leading equipment manufacturer Huawei Technology to develop handsets and other equipment based on TD-SCDMA.<sup>38</sup> 'China has become Siemens' global TD-SCDMA R&D center,' explains Siemens China Senior VP Gao Yan, 'and we will expand our R&D expertise in China.'<sup>39</sup> In short, clever policy and the gravitational pull of its vast market have given Chinese officials tools for the promotion of home-made technologies that their Japanese counterparts in the 1980s could only dream of.

China's standards strategy has far-reaching implications for the global economy. 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. The simple possibility of China aggressively pushing EVD as a DVD-alternative led several Western patent owners to reconsider the extent of royalty fees.<sup>40</sup> Likewise, China's WAPI retreat earned it lessened trade restrictions with the US. The minimalist view thus portends that indigenous standards act as a bargaining chip for China to counter the patent trap and to obtain other political objectives. Perhaps not yet fully capable of developing cutting-edge innovative technology, China can nevertheless leverage the threat of home-grown standards to get concessions from Western firms and governments. Yet as the following section shows, China is clearly serious about turning the tables on Western firms.

## MOBILIZING STRATEGIC STANDARDS IN STRATEGIC SECTORS

Over the last decade, the Chinese government has realised the importance of technological standards for international economic competitiveness. It is developing a focused strategy that harnesses the country's manufacturing potential and its growing ability to set and advance technical standards.<sup>41</sup> Coordinated by SAC and MII, this strategy has emerged in a range of technology fields, from digital cameras to computer operating systems. The government has identified sectors with rapid growth potential, where products rest critically on industry standards, and is forging ahead in a dozen or so (table 1).<sup>42</sup>

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<sup>36</sup> 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.

<sup>37</sup> 'Siemens to Invest \$310 Million in Asia for Wireless', *The Industry Standard*, 5 July 2001.

<sup>38</sup> 'Siemens, China's Huawei to set up 3G Joint Venture', *Asia Pulse*, 13 February 2004.

<sup>39</sup> 'Siemens aims to become leading 3G equipment vendor in China', *Business Daily Update*, 18 May 2004.

<sup>40</sup> Steve Lohr, 'Fast Gaining in Technology, China Poses Trade Worries', *The New York Times*, 13 January 2004, p. C1.

<sup>41</sup> *China Online*, 'Official Urges China to Develop e own standards fro IT Sector' 22 June 2000.

<sup>42</sup> For an industry perspective on this strategy see Paul Lee and Victor Long, *Changing China: Will China's Technology Standards Reshape your Industry?* (Deloitte&Touche, 2004). For a brief description of these various efforts, see Linden, 'China Standard Time' and Lee and Long, *Changing China*.

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**Table 1:  
Chinese National Technology Standards Initiatives Since 2000**

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<ul style="list-style-type: none"> <li>▪ Third Generation Mobile Phones</li> <li>▪ Digital Television</li> <li>▪ Wireless Area Networks</li> <li>▪ Enhanced Video Discs</li> <li>▪ Radio Frequency Identification</li> <li>▪ Satellite Positioning Systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ Audio Video Coding</li> <li>▪ Portable Storage Devices</li> <li>▪ Computer Security Chips</li> <li>▪ Digital Cameras</li> <li>▪ Fourth Generation Mobile Phones</li> </ul>
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Apart from previously noted efforts in the area of digital video players, open source software, wireless networks, 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 America's Global Positioning System (GPS) – underscore that China is mobilizing its resources to influence global standards debates across diverse areas.<sup>43</sup> Like no other current case, however, the controversy over Radio Frequency Identification (RFID) standards illustrates what is at stake.

#### **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 digital communications networks. Imagine every item having its own wireless transmitter. Obviously, this has radical implications for supply-chain management and logistics. 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 cloths. Because RFID, in contrast to bar codes, can store and transmit a lot more information and do so continuously, they have great potential to alter the terms of market competition. With dramatically augmented supply chain visibility and increasing customer transparency, large retailers could assume an even stronger position. 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 already valued at one billion in 2003 and will grow to three billion by 2007.<sup>44</sup>

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<sup>43</sup> Steve Pain, 'China's influence will shape future technology', *Birmingham Post*, 10 August 2004, p. 18.

<sup>44</sup> Bien Perez, 'RFIDs keep tag on clothes all the way to wardrobe', *South China Morning Post*, 18 March 2003, p. 4.

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 seventy percent of WalMart goods originate there. 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 multinationals, was still under development, leaving plenty of room for Chinese entry into the standards debate.<sup>45</sup>

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 a 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: '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.'<sup>46</sup> The taskforce was charged with developing a national standard that would be compatible with emerging international alternatives.

China's initiative quickly triggered heated lobbying efforts from EPC industry supporters that include leading US and European information technology companies and retailers. The Chinese government has been sending mixed signals in response. In an industry conference on the issues in May 2004, Chinese officials signalled some willingness to consider EPC.<sup>47</sup> But at the same time, China has forged ahead and has roped Japan and Korea into an effort to develop an Asian alternative, known as Ubiquitous ID. 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.' Zeng continues, 'If China becomes the single largest market, and China plus Japan plus South Korea become 51 percent of the global wireless market...altogether, what does that mean? It means China will become the new standards leader.'<sup>48</sup>

The RFID signals an additional aspect of China's standards strategy – the country's leaders are not merely looking inward in defiance of global markets but are rather proactively seizing the opportunities afforded by globalization. China need not always go it alone. Working in collaboration with other nations, China may be able to tip the international balance from one standard to another. As of early 2005, Chinese final intentions on RFID have remained guarded.<sup>49</sup>

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<sup>45</sup> 'China Seeking to Establish Supply Chain Tracking Technology Standard', *Xinhua Financial News*, 19 January 2004.

<sup>46</sup> 'RFID Standard to Revolutionize Manufacturing', *Financial Times Information*, 3 February 2004.

<sup>47</sup> 'China rallies support for US standards in tracking of goods', *South China Morning Post*, 11 May 2004, p. 4.

<sup>48</sup> 'Asian Partners set the Standard', *South China Morning Post*, 26 October 2004, p. 1.

<sup>49</sup> 'Nation Considers Frequency Standard', *China Daily*, 27 January 2005.

The ultimate effect of Chinese entry into the international logistics debate 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 the Chinese hope to develop their own standard to define the potential multibillion dollar RFID market, to forge a counterweight to Western dominance, or to 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 standardization process. And it is exactly 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 into Western standardization efforts integrates the Chinese into cutting edge technology development while the pursuit of national and regional efforts offers the prospect of breakthrough technological advances that could reshuffle China's international competitive position

### **THE DAWN OF STRATEGIC GOVERNANCE**

Viewing China's impact on the global economy principally through price changes obscures a more fundamental shift. Markets are transformed by strategic behaviour more dramatically than they are by changing prices. The ongoing political transformation of the Chinese state empowers policymakers to mobilise the country's vast market to attain strategic ends. Challenging Western dominance in the field of technology standards is an obvious first move.

But it need not stop there. The only thing about China's standards offensive that gives Western technology executives some comfort is the belief that indigenous technology development will inevitably lead China to finally embrace Western levels of intellectual property protection, not just in word but also in practice. Yet this too could be misleading. As China asserts itself in the global economy, it may well embrace an alternative intellectual property paradigm. While companies like Microsoft focus their attention on combating software piracy, the Chinese are moving to establish Red Flag Linux as a serious competitor for standard status in operating systems. It is fair to say that every dollar Microsoft spends attacking the pirating of Windows in China is ten dollars of free advertising for Linux. Open source software, such as Linux, rests on an alternative conception of intellectual property, one stressing the right to distribute rather than the right to exclude.<sup>50</sup> Similar tendencies are evident in pharmaceuticals. The Chinese government has already invalidated the patent on Viagra. But what China really needs is a low-cost pharmacy of cholesterol-lowering statin drugs to treat the metabolic syndrome of obesity, diabetes, and heart disease that is the scourge of the global middle class and increasingly of the Chinese middle class as well. Would it not make greater sense for a Chinese pharmaceutical firm to team up with low-cost generic manufacturers around the world and sell cheap statins to the four billion people on the planet who will never be able to afford Lipitor? Throw in the controversy over affordable access to AIDS drugs in much of the developed world and you have a compelling geo-strategic vision for a

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<sup>50</sup> Steven Weber, *The Success of Open Source* (Cambridge: Harvard University Press, 2004).

Chinese technology capability married with a distinctive set of property rights and business models that poses not just an economic challenge for the West, but perhaps even challenges the legitimacy of the liberal Western notion of global capitalism more broadly.

As China's impact on the global economy moves from China Price to China Standard and perhaps beyond, what should Western firms and governments do? We believe it is time to formulate a countervailing regulatory agenda. This is not just firm-to-firm competition; it is state-to-state competition as well. Governments and companies need to begin a dialog over how to best confront Chinese forays into the standards field. The Japanese challenge in the 1980s serves as a useful lesson. While Japan engaged in strategic trade that bundled public and private resources, US firms for a long time fought on their own. Only when they realised that the terms of market competition were at play in fundamental ways did they seek government support. As China reaps the fruits of its political transformation, we may well be entering a period of 'strategic governance,' a competition among different systems for industry coordination and standard setting. Government will play a critical role on the Chinese side and it is likely that Western firms will rely on their own governments as catalysts and facilitators of industry collective action as well. The temptation to break ranks and jump on a rival Chinese standard bandwagon – as evidenced by Texas Instruments and Philips in the case of WAPI – is considerable. If Western firms wish to defend their leadership in technology standards, they will have to work together.

Yet the West must walk a tightrope. Push China too hard in support of domestic business interests and you risk fuelling Chinese techno-nationalism. The danger is particularly great in the area of intellectual property rules. In Western business circles, some have already seized China's ascendance to demand swift action against lax Chinese intellectual property enforcement through formal WTO sanctions.<sup>51</sup> But such efforts could trigger an anti-Western backlash, especially if China broadens the debate, highlights the importance of access to affordable drugs and software, and casts Western efforts as outright 'IPR imperialism.'

The stage is set for a new round of global competition, one in which fundamental debates over the rules governing global markets will be reopened. Over the last three decades, China has modernised its economy, opened itself in an unprecedented fashion, and has become a global economic heavyweight that shapes world market prices as both consumer and producer. But in parallel fashion, China has also revamped its political structures. The country is quickly becoming a modern regulatory state with considerable abilities to influence market dynamics through standards and rules. Put the two parts together and you have a country that can project global regulatory influence in critical industries. As Western firms are busy adjusting to the China Price, they better not lose sight of the even more formidable challenge ahead.

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<sup>51</sup> Pat Choate, 'The Pirate Kingdom', *The New York Times*, 12 May 2005, p. A27.

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