



High-Technology Enterprises in China

During the last several years China's technological progress has not been insubstantial. I hope that during the 1990s, our progress will be even quicker. Every country has to establish a clear strategic goal, and they must achieve it. In the realm of high technology, China must also take its place in the world.

— DENG XIAOPING,
Statements on Science and Technology, 1992

The melding of the traditional economy and information technology will provide the engine for the development of the economy and society in the twenty-first century.

— JIANG ZEMIN,
22 August 2000

One of the main goals of the economic reform process started in 1978 by Deng Xiaoping was to raise China's indigenous technological capabilities. Like their counterparts in other developing countries, Chinese leaders have been dissatisfied with and unwilling to accept their place in the international division of labor. Policymakers in these countries want to leave behind industries dependent on low labor costs and second- or third-generation technologies, gradually replacing them with high-technology industries. These countries are not content to remain consumers of the newest technologies produced by more advanced economies. Industrializing states want to be as close to the cutting edge of technological innovation as possible; they hope to harness not only the economic but also the political, military, and social benefits that are expected from technology-intensive development. They expect, in Deng's words, to "take their place in the world."

This book examines one set of policies adopted by China to create an indigenous technological capability: the introduction and development of nongovernmental high-technology enterprises (*minban* or *minyǐng keji qiye*) in the information industries.¹ Building new technology enterprises is not

1. After 1993, the Chinese for "nongovernmental," *minban*, was replaced by *minyǐng*. I have used the later term.

easy, and many states, both developed and developing, have failed to find the right mix of policy support and market incentives. Chinese success in creating high-technology enterprises would deeply affect not only economic life within China but also the structure of the world economy and global politics.

The creation of successful high-technology firms is the next critical step for China in building a modern economy. Much of the recent work on the Chinese industrial economy has focused on either the difficulties of reforming state-owned enterprises (SOEs) or on the growth of town and village enterprises (TVEs). As the foundation of China's industrial base, SOEs warranted the scholarly attention paid to them. These enterprises provide the basic industrial inputs for the economy, the bulk of fiscal revenue for local governments, and employment and social welfare for a large part of the urban population. As in other socialist economies, the foundation these enterprises provided was somewhat shaky; they have been characterized by low productivity, declining profit, and overstaffing. Banking reform, fiscal liberalization, and overall economic growth hinged on SOE reform.

The shape of China's domestic economy, however, is changing. The share of industrial output produced by SOEs has gradually declined throughout the reforms, from 78 percent in 1978, to under 35 percent in 1995. In 2001 SOEs accounted for only 20 percent of national industrial output. The decline in industrial output was made up in the nonstate and collective sectors that have been the most dynamic parts of the Chinese economy. Employment and total factor productivity have grown much faster in the nonstate sector. TVEs now dot the Chinese countryside, and they have produced a flood of light manufactured goods for the export market. These small, flexible, market-oriented enterprises account for a large part of the growth and dynamism of the Chinese economy over the last twenty years.

That said, China's leaders do not want to remain dependent on the TVE as the engine of growth forever. Central policymakers have been growing increasingly hesitant about relying on a labor-intensive export strategy. China is eager not to miss the next wave of technological development, as it did in the 1960s, 1970s, and 1980s, and seeks to make government policy more favorable to innovation. As one Chinese commentator writes, "The greatest difficulty that all export-oriented enterprises in our country face is to produce the right products; low labor costs will not last forever. Competition between products in the international market is in fact technological competition."²

One of the arenas in which the Chinese hope to compete is information

2. "Heading for the World by Relying on Science and Technology," *Renmin Ribao* [People's daily], 7 December 1988, in *Foreign Broadcast Information Service-China* (hereafter FBIS-CHI), 12 December 1988, 31-32.

technologies (IT), and IT industries have grown rapidly in China. The domestic IT market was worth \$168 billion in 2000, nine times larger than in the beginning of the 1990s. During the 1990s, the IT sector registered the fastest growth rates among the country's industrial sectors. By 2005, at the end of the Tenth Five-Year Plan, the Chinese expect to have invested \$500 billion in the sector, raising the contribution of IT to gross domestic product to 5 percent. Claims of the impact of information technologies and the "new economy" in China have often been wildly overstated. Before the economic slowdown of 1999 and the Nasdaq market slump affected technology companies in the United States and China, many expected internet and other IT companies to create another Silicon Valley and completely change the way business was done on the mainland. The fizzle of internet business in China has moderated some of the most breathless writing on technology development, but this correction does not diminish the need for putting the growth of technology enterprises into a larger economic and political context. Understanding the transition from a state socialist to a market economy during the first two decades of reform required a description of the difficult, stop-and-go process of state-owned enterprise reform. Understanding the continued transformation of the Chinese economy now demands an explanation of the process of creating an indigenous technological capability.

The potential impact of competitive Chinese technology firms would reach far beyond the domestic economy. There is little doubt that in the future China will have a large economy; the Chinese economy has quintupled in size since the 1980s, and in 1992 the World Bank announced, based on the purchasing parity index, the Chinese economy was the world's third largest. But without a high-technology capability, China is unlikely to become a modern global economic power like Japan or the United States. An indigenous technological capability would mean that, for the first time since the Ming Dynasty (1368–1644), China would be actively involved in defining, not just accepting, international technological standards. A technologically advanced China will have less demand for foreign technology and may slowly move away from a development strategy based on labor-intensive goods, import substitution, and export-led growth.

Moreover, technological development addresses some of the larger strategic concerns of the current Chinese leadership. Chinese technology policy reveals a historically rooted concern with technological autonomy, and an indigenous technological capability would reduce dependence on foreign technology, especially from Japan and the United States. More directly, all modern Chinese leaders have struggled to achieve a "rich country, strong army" (*fuguo, qiangbing*), and a high technology economy would lay the foundation for future improvements in military power, further complicating Sino-American military relations. After continued tensions across the Taiwan Straits in 1999, Jiang Zemin reportedly linked a "sound base in

technology and national defense” to the success of the mainland’s reunification strategy.³

The process of creating nongovernmental enterprises in China has not resulted in either clear success or failure at the national level. Instead, the earliest results of attempts to create high-technology enterprises in the information industries have been uneven; variation has emerged at the regional level. At the national level, the reforms of the state science and technology system consisted of two programs: the decentralization of authority for research, development, and production to lower levels, and the creation of new spin-off enterprises defined by hybrid property rights. In the ideological context of the early reform period, the central government could not promote private enterprises and instead created the category of *minyingshi qiye*, or nongovernmental enterprise, as a hedge between the enterprises found in centrally planned economies and the firms that operate in more open markets. But the central government never clearly defined what the nongovernmental category meant. Originally intended as a new type of property rights structure, *minyingshi* in fact came to cover all types of property rights, including state-owned, collective, and private.

Local governments interpreted the meaning of nongovernmental differently, and so the implementation and results of technology policies varied by region. Local authorities in Beijing, Shanghai, Guangzhou, and Xi’an implemented central government directives in three areas—property rights, investment structures, and government regulation—differently, thus creating distinct local economies. Variation in policy resulted in different market structures, and so enterprise size and organization, ownership structures, and relationship of the enterprise to the state all varied regionally. These market structures were ultimately decisive for the success of high-tech nongovernmental enterprises in different regions of China. In Beijing, during the 1980s and 1990s, a number of competitive nongovernmental enterprises emerged. By contrast, during the same period, *minyingshi* enterprises languished on the margins of the local economy in Shanghai, Xi’an, and Guangzhou.

The long-term competitiveness of the Chinese IT sector remains open to question, especially after China enters the World Trade Organization and exposes domestic producers to foreign competition. Currently many enterprises rely less on new innovations and more on copying technology from abroad; the percentage of technologies domestically produced by nongovernmental entrepreneurs is often very small. High-technology entrepreneurs still face daunting barriers to growth in China. Venture capital is scarce, property rights ill-defined, and management systems underdeveloped. Local governments have varied and continue to differ in how well they have responded to these barriers. Local officials must help entrepre-

3. Willy Wo-Lap Lam, “Jiang Boosts Defense Funding,” *South China Morning Post*, 1 December 1999.

neers gain access to scarce resources while not compromising enterprise autonomy.

This book explains not only how technology policies differed but also why, by placing the choices of officials in Beijing, Shanghai, Xi'an, and Guangzhou within their local contexts. Patterns of technological development emerged from the interaction among factor endowments, public policy, and local cultures. Local officials made decisions within particular economic systems; the science and technology (S&T) resources locally available, the balance of power among local actors, the locality's relationship to the central economy, and traditional patterns of industrial policy all shaped the trajectory of technological development. Seeking to develop new industrial sectors, local officials found their choices constrained by institutional resources. They also relied on traditional ideas about how to organize economic activity. These beliefs were widely shared among and provided guidance to local officials on how enterprises should be organized, how enterprises should relate to each other, and how they should interact with the local government. These economic ideas changed technological development from an apolitical outcome to a political process and helped local officials construct a narrative of development, an explanation of how they were going to move from their institutional constraints to their desired economic outcomes.

THE ROLE OF THE STATE IN TECHNOLOGICAL DEVELOPMENT

Explaining how different local patterns of development emerged is critical to understanding economic change in China. An analysis of regional variation in Chinese economic development also exposes some of the weaknesses of traditional accounts of technological development, especially in their depiction of the state. One of the central concerns of comparative political economy has been the role of the state in economic development, and the experiences of the industrializing countries of East Asia have been central to debates between free-market advocates and proponents of state intervention. Although many neoclassical economists and other scholars of development argue that the state is likely to act as an impediment to industrial transformation, extracting rents from and fostering uncertainty in domestic markets, many scholars of Japan, Korea, and Taiwan contend that the state could and in fact did play a more positive, "developmental" role. According to the latter group, central ministries such as the Ministry of International Trade and Industry (MITI) in Japan or the Economic Planning Board (EPB) in Korea played a key role by identifying and promoting critical development goals.

Chalmers Johnson, for example, argues that following World War II the Japanese central state acted like a banker, raising funds and directing the transformation of industrial sectors in cases where entrepreneurs were un-

able to raise the capital necessary to master the newest production technologies.⁴ Late industrialization in Korea, according to Alice Amsden, required more of the state than acting like a banker. Through the allocation of subsidies, the Korean state played the role of the entrepreneur, “deciding what, when, and how much to produce.”⁵ Similarly in Taiwan, when local entrepreneurs did not see or were unaware of investment opportunities, the state created incentives that made productive investment decisions hard to avoid.⁶ Thomas Gold argues that the Kuomintang “just did not get prices right, but it restructured society, channeled funds for investment, intervened directly in the economy, created a market plan, devised indicative plans, determined physical and psychological investment climate, and guided Taiwan’s incorporation into the world capitalist system.”⁷

The original terms of debate between advocates of free markets and state intervention were starker than they needed to be, and more recent scholarship has narrowed the gap between the two.⁸ Though the state may have a positive role in development, it is rarely successful without the cooperation of the private sector. Different types of producer, supplier, and information networks may have a variable impact on state intervention.⁹ On the other side, free-market advocates now pay greater attention to nonmarket institutions that bolster the competitiveness of individual enterprises. Development requires more than getting prices right; smoothly operating markets require clear property rights, a social welfare system, and relatively transparent administration. Government policy plays a critical role not only in opening markets up but also in fostering assets and institutions that increase competitiveness in the system.¹⁰ The question of how (and if) the state builds market-supporting organizations is central to this book. But the Chinese case suggests that previous works of comparative political economy have focused too much on the role of the central state in creating institutions at the national level. For example, the success of developmental states, according to the sociologist Peter Evans, depends on a balance between institutional autonomy and dense links to societal actors. Informal

4. Chalmers Johnson, *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975* (Stanford: Stanford University Press, 1982), 27–28.

5. Alice Amsden, *Asia’s Next Giant: South Korea and Late Industrialization* (New York: Oxford University Press, 1989), 143.

6. Robert Wade, *Governing the Market: Economic Theory and the Role of the Government in East Asian Industrialization* (Princeton, N.J.: Princeton University Press, 1990).

7. Thomas Gold, *State and Society in the Taiwan Miracle* (Armonk, N.Y.: M. E. Sharpe, 1986), 122.

8. The emerging consensus on state-market relations is reflected in World Bank publications like Shahik Burki and Guillermo Perry, *Institutions Matter: Beyond the Washington Consensus* (Washington, D.C.: World Bank Latin American and Caribbean Studies, 1998).

9. Chung-in Moon and Rashmi Prasad, “Networks, Politics, and Institutions,” in *Beyond the Developmental State: East Asian Political Economies Reconsidered*, ed. Steve Chan, Cal Clark, and Danny Lam (New York: Palgrave, 1998), 9–24.

10. David G. McKendrick, Richard F. Doner, and Stephan Haggard, *From Silicon Valley to Singapore: Location and Competitive Advantage in the Hard Disk Drive Industry* (Stanford, Calif.: Stanford University Press, 2000).

networks, both internal and external, give MITI or the EPB an internal coherence and corporate identity, and also tie officials to private power holders.¹¹ Bureaucratic actors may be autonomous and coherent, but they are also embedded in a concrete set of social relations. Too much autonomy distances governments from social actors and makes them dependent on decentralized private actors for implementation. Too little and state actors, subject to individual or special interest group demands, cannot resolve collective action problems. State capacity and the ability to transform the economy is a product of what Evans calls “embedded autonomy”: bureaucratic insulation with intense connections to the surrounding social structure.¹²

Unlike in Japan or Korea, no organ of the central state in China has been able to intervene effectively in new technology markets. The Chinese central state lacks both internal coherence and strong ties to society.¹³ Moreover, the state, at least at the center, has not been able to overcome these institutional weaknesses by developing expansive ties to important social actors.¹⁴ The Ministry of Science and Technology, which replaced the State Science and Technology Commission (SSTC) and was the government bureau most responsible for nongovernmental enterprises, lacked administrative power. Moreover, *minying* entrepreneurs rarely speak of the Ministry of Information Industries (MII) or any other ministry as critical to their development. Central state ministries like the MII are more likely to be seen as barriers to growth, restricting the access of foreign investors to domestic producers and tightly controlling content on the internet.

The state still plays a critical role in technological development in China, that role is just not limited to the highly visible and identifiable organs of the central state that have been the main subject of state-centered approaches. The Chinese state is a less monolithic, much more diffusely dispersed set of institutions than suggested by Evans and by the developmental state literature. Government support remains crucial to growth in China, but the most important links are to the enterprise’s supervisory agency (*zhuguan danwei*), which can be a university, research institute, state-owned enterprise, or local government. All of these are “state” actors, but none resemble MITI or the EPB. The Chinese case forces us to view the state as a more decentralized organizational structure embedded within a range of institutional, political, and social arrangements at the central and local level.

11. Peter Evans, *Embedded Autonomy: States and Industrial Transformation* (Princeton, N.J.: Princeton University Press, 1995), 49.

12. *Ibid.*, 50.

13. Michael Oksenberg and Kenneth Lieberthal, *Policymaking in China: Leaders, Structures, and Process* (Princeton, N.J.: Princeton University Press, 1988).

14. Vivienne Shue, “State Power and Social Organization in China,” in *State Power and Social Forces: Domination and Transformation in the Third World*, ed. Joel Migdal, Atul Kohli, and Vivienne Shue (Cambridge: Cambridge University Press, 1994), 67.

Instead of discussing the role of the state, this book focuses on the behavior of and the interaction between the central and various local governments involved in technology development. The “state” is used to refer to a set of political relations that encompasses branches of the central, provincial, city, and district governments. These relations define politics within the state, between the state and society, and between the polity and some international actors.¹⁵ Viewing the state as a set of relations makes it easier to see development as the outcome of both the competition and interaction between the central and local governments. The decentralization of state authority to lower levels has increased the power and autonomy of local governments, but the local and central governments are not polar opposites, engaged in a zero-sum game. Local governments operate in a context shaped by local institutions and the central government, and the two levels of government reinforce each other.

The case of technology policy in China also demonstrates that the process of economic development is not simply the story of the central state intervening in a cohesive national economy. The national economy needs to be disaggregated like the central state. Geographically distinct economies can exist within national boundaries. Richard Locke argues that distinct regional economies continue to exist within the seemingly unified Italian national economy.¹⁶ And Gary Herrigel notes, “Different actors, in different regions, with different histories, institutions, and cultures, will invariably conceptualize, organize and enact industrial activity in ways that reflect their own peculiar pasts and contextually and discursively engendered conceptions of and strategies for the future.”¹⁷ Yet in most explanations of economic development, the subnational level disappears; growth is the result of creating the appropriate political and economic institutions at the national level.¹⁸ While regional economies may exist within national economies, they are generally portrayed as premodern remnants to be gradually absorbed into the central economy.

In fact, the process of development occurs at both the national and subnational level and focusing solely on the national level overlooks many of the mechanisms that are actually driving development.¹⁹ Herrigel describes

15. Peter J. Katzenstein, *Cultural Norms and National Security: Police and Military in Postwar Japan* (Ithaca, N.Y.: Cornell University Press, 1996), 4. Also see Vivienne Shue, *The Reach of the State: Sketches of the Chinese Body Politic* (Stanford, Calif.: Stanford University Press, 1988), 4.

16. Richard Locke, *Remaking the Italian Economy* (Ithaca, N.Y.: Cornell University Press, 1995), 24–27.

17. Gary Herrigel, *Industrial Constructions: The Sources of German Industrial Development* (Cambridge: Cambridge University Press, 1996), 26.

18. These approaches were influenced by the national model school developed by Andrew Shonfield. See his *Modern Capitalism: The Changing Balance of Public and Private Power* (New York: Oxford University Press, 1965). See also the authors collected in Peter J. Katzenstein, ed., *Between Power and Plenty: Foreign Economic Policies of Advanced Industrial States* (Madison: University of Wisconsin Press, 1978).

19. Adam Segal and Eric Thun, “Thinking Globally, Acting Locally: Local Governments, Industrial Sectors, and Development in China,” *Politics & Society* 29, 4 (December 2001): 557–88.

how in Baden Württemberg small and large firms have developed a regionally based comparative advantage lacking in other parts of Germany. The regional economy has developed faster than other parts of the national economy by “socializing risk across a broad array of public and private organizations.”²⁰ Similarly, AnnaLee Saxenian notes that in high-technology sectors, firms in Silicon Valley created a regional economy better able to respond to market changes in the late 1980s than corporations around Route 128 in Boston.²¹ Dense social networks and open labor markets characterized Silicon Valley’s regionally based industrial system and promoted collective learning, experimentation, and entrepreneurship.

Regional economies continue to play an important role in developed economies, and their influence may be even more critical and widespread in more transitional ones. Countries such as China that are undergoing rapid economic and social change have less uniformity than countries that have enjoyed long periods of stability. Even in developing countries with more centralized government institutions than China, pockets of development, or “industrial clusters,” have emerged within very low rates of overall national growth. Horizontal relations that foster information exchanges, skill transfers, and capital accumulation characterize these clusters.²²

Economic reform in China has produced a national economy that looks like a mosaic of regional economies.²³ The center expanded both the decision-making authority of local governments and their ability to retain the revenue earned within their respective jurisdictions.²⁴ As a result, localities pushed local development, sometimes by implementing a local industrial policy that ignored national objectives. Even on issues officially controlled by the center, a local government’s interpretation and its degree of compliance with the directives were often the more important determinants of actual policy.

The developmental state approaches discussed above offer important insights into technological innovation by focusing attention on the critical role played by state actors and the policies that created the organizational

20. Gary Herrigel, “Large Firms, Small Firms, and the Governance of Flexible Specialization: The Case of Baden Württemberg and Socialized Risk,” in *Country Competitiveness*, ed. Bruce Kogut (New York: Oxford University Press, 1993), 17.

21. AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, Mass.: Harvard University Press, 1994), 2–3; and AnnaLee Saxenian, “Regional Networks and the Resurgence of Silicon Valley,” *California Management Review* 33, 1 (1990): 89–113.

22. Khalid Nadvi and Hubert Schmitz, *Industrial Clusters in Less Developed Countries: Review of Experience and Research Agenda*, Institute of Development Studies, Discussion Paper 339 (January 1994), 36.

23. It is probably more accurate to say that reforms were the catalyst for the reemergence of local economies; regional economies existed in China even under the central plan. See G.W. Skinner, “Marketing and Social Structure in Rural China,” *Journal of Asian Studies* 24, November 1964, February 1965, May 1965.

24. Susan L. Shirk, *The Political Logic of Economic Reform in China* (Berkeley: University of California Press, 1993).

space for entrepreneurial activity. Yet we can only understand the process of development by understanding the decisions local actors made, and how these actors were embedded in distinct local histories with different institutional constraints and opportunities.

ONE CHINA, MANY ECONOMIES

The growing importance of local governments has been widely documented in post-Mao China. Jean Oi, for instance, argues that increased fiscal incentives gave rise to a new form of state-led growth in rural China, what she calls local state corporatism: a system in which local governments “treat enterprises within their administrative purview as one component of a larger corporate whole.”²⁵ Victor Nee focuses on how increased market pressure led local governments and private firms to form alliances as protection against an uncertain environment, and Susan Whiting explains why property rights arrangements evolve in different ways in different regions and how this variation affects the extractive capacity of the state.²⁶

Andrew Walder’s work on town and village enterprises is particularly helpful for our thinking about different types of local governments and technological development. In explaining variation in rates of growth between dynamic TVEs and seemingly moribund SOEs, Walder does not focus on property rights alone and instead notes important institutional differences between government actors in rural and urban contexts.²⁷ Industrial productivity and growth vary between the two areas because the organizational characteristics of local governments vary, not because some firms are collectively owned, while others are owned by the state. The size and degree of internal diversification of local governments affect the intensity of financial incentives and budget constraints. Lower levels of government mainly located in rural areas can more effectively monitor enterprises, enforce financial constraints, and are less likely to burden enterprises with nonfinancial objectives. Governments at higher levels face greater political constraints, larger nonfinancial burdens, and a limited ability to monitor enterprise performance and enforce financial discipline. In the case of IT, there was not a significant difference between the size and diversification of the local governments discussed in this book. Other organizational characteristics—the balance of power among different gov-

25. Jean Oi, “Fiscal Reforms and the Economic Foundations of Local State Corporatism in China,” *World Politics* 45, 1 (October 1992): 99–126.

26. Victor Nee, “Organizational Dynamics of Market Transition: Hybrid Property Forms and Mixed Economy in China,” *Administrative Science Quarterly* 37 (1992): 1–27; Susan Whiting, *Power and Wealth in Rural China: The Political Economy of Institutional Change* (Cambridge: Cambridge University Press, 2001).

27. Andrew Walder, “Local Governments as Industrial Firms: An Organizational Analysis of China’s Transitional Economy,” *American Journal of Sociology* 101, 2 (September 1995): 263–301.

ernment departments at the local level, the relationship of the locality to the center—still differed in ways that affected technological development.

What was strange in the case of technological development was not that institutional structures varied within China, but that the institutional structures most compatible with enterprise development were in Beijing. Highly centralized S&T systems, like the one found in China, tend to stifle innovation.²⁸ State policy usually has a pervasive and pernicious influence on firm organization, encouraging centralized and hierarchical organizations inappropriate to rapid technological development. Ties to the central government, easily developed though geographical proximity and reliance on the government as a primary customer, often encourage firms located in the capital to replicate the centralized organization of the state. Guaranteed markets, development aid, and subsidies all diminish market pressures for organizational changes within firms. Few countries boast of an innovative technology center located in the political capital; in India software firms thrive in Bangalore, in France innovative firms have emerged near Grenoble, in the United Kingdom outside Cambridge, in Italy outside Milan, and in the United States in Boston and northern California.

Given these difficulties, we would expect high-tech enterprises in Beijing to be less able to re-create themselves independently of the central government than enterprises in other parts of the country. In fact, through building housing and providing other social benefits, some high-tech enterprises have re-created the institutional features of the *danwei*, the work unit at the center of state-owned enterprises.²⁹ The growing regionalization of the Chinese economy should also increase the incentives for locating high-tech enterprises outside of the center. During the 1980s and 1990s the highest rates of growth were in coastal provinces like Fujian, Guangdong, and Jiangsu. In these areas, local officials and managers of collective enterprises were the most active in developing extensive networks to help support industrial development.³⁰ If a locality can mobilize local S&T resources (or attract them from other provinces), high-tech enterprises, with their high rates of profit and widespread impact on the local economy, should represent an attractive potential development ally for local governments.

Added to the growth of Beijing, the lack of IT entrepreneurship in Shanghai was itself counterintuitive. At the beginning of the reform process, there were a number of reasons to believe that its technology enterprise development would be more robust than Beijing's. First, Shanghai

28. Robert Gilpin, *France in the Age of the Scientific State* (Princeton, N.J.: Princeton University Press, 1968); and John Zysman, *Political Strategies for Industrial Order: State, Market, and Industry in France* (Ithaca, N.Y.: Cornell University Press, 1977), 19.

29. Corinna-Barbara Francis, "Reproduction of the Danwei Institutional Features in the Context of China's Market Economy: The Case of Haidian District's High-Tech Sector," *China Quarterly* 147 (September 1996): 839–59.

30. You-tien Hsing, *Making Capitalism in China: The Taiwan Connection* (New York: Oxford University Press, 1998), 118.

was both the country's most important supplier of electronics products and a key research and development (R&D) base. Second, Shanghai already played a leading role in the consumer electronics sector. In 1981, for example, Shanghai produced 22 percent of all televisions and 37 percent of all tape recorders in China.³¹ Finally, even cultural stereotypes favored Shanghai: the Shanghainese are usually viewed as entrepreneurial business people, while their Beijing counterparts are viewed as candid peasants more attuned to politics than business.³²

To explain these outcomes, I build on the work on local governments done by Oi, Nee, Walder, and others. Their studies, however, tend to focus on one region and one type of industry. Local state corporatism may be an effective developmental strategy, but it may not work under all conditions for all types of industrial sectors. Institutional arrangements need to be compared across similar administrative units, not just between municipal governments and rural townships. By looking at the same sector across China, and at how development patterns varied by region, we can better link local institutions with the failure or success of specific sectors. Understanding the development patterns of Beijing, Shanghai, Guangzhou, and Xi'an forces us to focus more closely on how the capacity of state institutions and economic organizations at the local level determine a region's developmental capacity.

WANTED: A GOOD MOTHER-IN-LAW

Macro-level state policies created the category of nongovernmental enterprise, but the development trajectories of these enterprises depended on the decisions of local government officials. The choice for a local government in China was not whether it should intervene, but how to intervene and best help organize new industrial sectors. And some local governments made wiser choices than others, supporting enterprise systems more compatible with the needs of the information industries.

In some industries, it is not uncommon for a local government to be directly involved in production. The local government acts as an important monitoring agency, settling disputes between suppliers; the local government may help overcome collective action problems or even own shares of production facilities.³³ When production is dispersed among diverse groups

31. Detlef Rehn, "Organizational Reforms and Technology Change in the Electronics Industry: The Case of Shanghai," in *Science and Technology in Post-Mao China*, ed. Denis Fred Simon and Merle Goldstein (Cambridge, Mass.: Harvard University Press, 1989), 144.

32. Yang Dongping, *Chengshi Jifeng: Beijing he Shanghai de Wenhua Jingshen* [City monsoon: The cultural spirit of Beijing and Shanghai] (Beijing: Dongfang Chubanshe, 1994).

33. Mark Granovetter, "Economic Action and Social Structure: The Problem of 'Embeddedness,'" *American Journal of Sociology* 91, 3 (1985): 481-510; and Mark Granovetter, "Economic Institutions as Social Constructions: A Framework for Analysis," *Acta Sociologica* 35, 1 (1992): 3-13.

of producers and suppliers within a region, local governments can provide specific administrative functions that support the region's production system.³⁴

Even in sectors where the authorities are less centrally involved in production networks, local governments can shape new markets in other ways. In particular, governance structures, the social institutions that guide the interaction between enterprises and between enterprises and the local government are especially susceptible to government influence at the beginning stages of market creation. As the sociologist Neil Fligstein argues, "Property rights, governance structures, and rules of exchange are arenas in which modern states establish rules for economic actors. States provide stable and reliable conditions under which firms organize, compete, cooperate, and exchange."³⁵ Uncertainty in external markets means that technology firms often develop extensive social ties to other firms within the same geographical region. Innovation involves multiple actors and springs from the combination of various actors with specialized and complimentary competency and knowledge.³⁶ Social, political, and economic organizations located outside the enterprise can bolster internal capabilities. Links among various actors—formal or informal, institutionalized in written contract or informal trade practices—facilitate information flows, allow for specialization, mediate conflict, and define the terms of cooperation and competition between firms.³⁷

The fact that many of these institutions are civic organizations or producer associations has led some to overstate the degree to which they are independent from government actors. This has been especially true in descriptions of Silicon Valley, where the roles of the federal and California governments have attracted little discussion.³⁸ Moreover, the belief that technology sectors change too rapidly for effective government intervention is fairly widespread. Yet there are at least two reasons to move government actors back to the center of technology development, one more general, the other specific to developing economies. First, even in the more developed economies, nonmarket institutions that support the high-tech market are in fact heavily influenced by government actions.³⁹ As Lawrence Lessig notes, "Innovation has always depended on a certain kind of regula-

34. For the role that Shanghai's local government plays in the auto industry, see Eric Thun, "Changing Lanes in China: Reform and Development in a Transitional Economy" (Ph.D. diss., Harvard University, 1999).

35. Neil Fligstein, "Markets as Politics: A Political-Cultural Approach to Market Institutions," *American Sociological Review* 61 (1996): 660.

36. OECD Proceedings, *Boosting Innovation: The Cluster Approach* (Paris: OECD, 1998), 11.

37. Gerald Davis and Heinrich R. Greve, "Corporate Elite Networks and Governance Changes in the 1980s," *American Journal of Sociology* 103, 1 (July 1997): 1–38; and G.B. Richardson, "The Organization of Industry," *Economic Journal* 82, 327 (September 1972): 883–96.

38. Saxenian, *Regional Advantage*; and the reviews of *Regional Advantage* in *Economic Geography* 71, 2 (April 1995): 199–207.

39. Bai Gao, *Economic Ideology and Japanese Industrial Policy: Developmentalism from 1931 to 1965* (New York: Cambridge University Press, 1997), 7.

tion.⁴⁰ Government decisions about regulation, property rights, licensing, and standards all influence the structure of social institutions.

Second, without some sort of government support, the chances of a technology enterprise succeeding in China were exceedingly slim. There are distinct disadvantages to being a latecomer in technological development, and unlike in neoclassical accounts of development, the market alone could not overcome problems like incomplete information.⁴¹ At the early stages of development in China, civic or producer groups did not exist to foster ties between technology enterprises. Ties to public institutions were essential to the early stages of growth, especially given China's small technological market and its lack of venture capital.⁴² As one manager in a (successful) Xi'an enterprise bluntly put it: "No government support, no nongovernmental enterprise success."⁴³

This does not give local officials justification to intervene whenever and however they want. Local governments had to provide a certain type of support. There were more and less successful strategies of government intervention that fell somewhere in between the spectrum of market-driven and state-led development strategies. In the case of Taiwan and Korea, Stephan Haggard describes a set of interventions that reduced the risks of shifting into the export business for domestic firms by providing various incentives and by lowering information and transaction costs.⁴⁴ First, Taiwan and Korea used a strategy of import substitution (IS) to build up a market in intermediate and capital goods and to strengthen domestic manufacturing capabilities. Soon after, this strategy was replaced with the liberalization of imports and exchange rate reform. Key to the success of Taiwan and Korea was that these interventions did not last too long. Taiwan and Korea did not engage in IS long enough to distort the incentives for domestic producers or create opportunities for government actors to engage in rent seeking. Once enterprises upgraded their manufacturing capabilities they were exposed to international pressure; infant industries had to move quickly into the global market.

With Chinese information industries, successful government intervention has been distinguished less by chronology and more by scope. That is, most of the earliest nongovernmental enterprises entered areas where domestic producers already had a comparative advantage; even if the domestic market had not been protected, there were few, if any, foreign firms that

40. Lawrence Lessig, "Innovation, Regulation and the Internet," *The American Prospect* 11 (27 March 2000). Available online at <http://www.prospect.org/print/V11/10/lessig-1.html>.

41. Alexander Gerschenkron, *Economic Backwardness in Historical Perspective* (Cambridge, Mass.: Harvard University Press, 1962).

42. Scott Kennedy argues that *minying* firms actually succeed because they have no ties to the government. See "The Stone Group: State Client or Market Pathbreaker," *China Quarterly* 152 (December 1997): 746–77.

43. Interview, no. X8, 27 July 1998.

44. Stephan Haggard, *Pathways from the Periphery: The Politics of Growth in the Newly Industrializing Countries* (Ithaca, N.Y.: Cornell University Press, 1990), 93.

had the technology and skills necessary to produce Chinese language software.⁴⁵ In the Chinese case, local government support helped enterprises overcome many of the barriers that characterize new markets: incomplete information, undefined property rights, and price distortions.

Moreover, and somewhat paradoxically, government intervention could protect domestic producers from extractive state agencies. Local commercial and industrial bureaus, for example, were less likely to levy illegal taxes on enterprises linked to other branches of the local government. In addition, entrepreneurs could rely on these government actors to settle disputes with other public agencies. For technology enterprises to succeed, local governments had to balance the desire to help with the tendency to infringe on enterprise autonomy. This was not easy to do since the lines of investment and ownership and managerial authority were not clearly defined or demarcated at the beginning stages of reform. Entrepreneurs often complained that supervisory agencies confused making a loan with investing.

Entrepreneurs referred to the ideal type of support as being a “good mother-in-law” (*hao po po*). The best mother-in-law did not interfere with the internal workings of the enterprise, with the relationship between husband and wife, but supported the couple in their search for a new apartment or the raising of the children. Not having a “mother-in-law” meant the enterprise was on its own, unable to influence official agencies and susceptible to a range of extractive agents. Entrepreneurs wanted to maintain stable relations with one supervisory agency, and only one. As one entrepreneur put it, “Having no mother-in-law is bad, having too many is even worse.”

LOCAL GOVERNMENTS AND TECHNOLOGY POLICY

Government decisions about property rights, funding structures, and how (and how often) to supervise enterprises significantly shaped enterprise structures. These decisions and other government pronouncements also sent more indirect signals to entrepreneurs about what type of enterprises would or would not be accepted or supported in an uncertain political environment (see table 1.1). Beijing combined guidance to entrepreneurs while still allowing them to shape the emergence of the sector. Local officials in Xi’an and Shanghai tended to provide government support while at the same time interfering with internal enterprise management. Guangzhou fell toward the other extreme; government officials did not intervene in daily business operations, but they also did not provide the supervision required to overcome market failures.

45. This is the case for domestic competitors as well. The first nongovernmental enterprises entered new sectors where there was no SOE presence and no ministerial supervision.

Table 1.1. Types of Local Government Support

	Beijing	Shanghai	Guangzhou	Xi'an
	Science based, research institutes	Labs within SOEs	Basic infrastructure	Science based, research institutes
I) Investment	Loans, FDI to <i>minying</i> enterprises	Loans, FDI funneled to SOEs	Only FDI to small collective private enterprises	Loans to SOEs, very limited FDI
II) Property Rights	Multiple forms of ownership	Limited stock companies for SOEs; large groups (<i>jituan</i>)	Collective then private	SOEs, limited stock companies
III) Government Supervision				
a) Market Activities	Horizontal	Vertical ties; large groups	Hands off	Horizontal and vertical
b) Political Activities	<i>Minying</i> enterprises at center of technological development	<i>Minying</i> as complement to SOEs	All private	Between being at center and being a complement to SOEs

Local governments had a surprising degree of freedom to determine ownership structures. The arrival of the first *minying* enterprises in the early 1980s forced local governments to decide when they were going to recognize these enterprises and create procedures for registering and regulating enterprises. After it became clear that ambiguous connections between enterprises and supervisory agencies limited growth, some officials encouraged collective enterprises to register as private or nongovernmental enterprises. Some officials, however, moved in the opposite direction, registering private enterprises as collective; this was known as “wearing the red hat” (*dai hong maozi*) and protected local officials from attacks that they were encouraging still-suspect private ownership. Later local governments had to decide when and if they were going to encourage the formation of limited stock companies, the issuance of technology shares, and the listing of companies on domestic and foreign stock markets. These structures affected the distribution of wealth within enterprises and the incentives entrepreneurs and scientists have for engaging in productive activity.⁴⁶ The

46. Margaret Blair, *Ownership and Control: Rethinking Corporate Governance for the Twenty-first Century* (Washington, D.C.: Brookings, 1995), 11; and David Soskice, “German Technology Policy, Innovation, and National Institutional Framework,” *Industry and Innovation* 4, 1 (1997): 77.

most efficient *minying* enterprises created a system that allocated authority to the individuals most likely to have the information necessary to use resources efficiently to create wealth.

Local government decisions about funding were equally important to new organizational structures. The most important signal that *minying* enterprises were to be encouraged was the expansion of bank loans to enterprises; officials could either direct banks to loan to nongovernmental enterprises, act as guarantors for enterprises seeking loans, or create innovation funds that directly loaned to enterprises. Local governments could also influence enterprise structure by funneling R&D expenditures to independent research institutes as opposed to labs attached to SOEs, or by deciding to fund the development of new technologies instead of raising the level of current equipment.

Finally, local governments had to decide how they were going to supervise nongovernmental enterprises. The most activist governments maintained a position on the board of directors. Other local governments limited their interventions into the business operations of the enterprise, but adopted more diverse social and political roles in the new sector: supporting the *minying* enterprise association, assisting with the acquisition of residence permits (*hukou*) for S&T personnel from outside the city, or arranging management seminars for new entrepreneurs. In addition, local governments often created new organizations that fostered horizontal links between research and production units or allowed scientists to moonlight from their public-sector jobs for private or collective enterprises. These actions often encouraged scientists to leave their research jobs and establish their own enterprises.⁴⁷

PATTERNS OF DEVELOPMENT

The interaction of national technology policy and local governments created distinct patterns of nongovernmental enterprise development that differ along three dimensions: the quantity and quality of local government ties, enterprise size and ownership structures, and the extent of horizontal ties to other actors (see table 1.2). These dimensions were important for the types of IT most likely to develop in a locality. In short, these development patterns fit certain types of enterprises and certain types of technologies.

Even within the broad category of information technologies, specific types of technologies require different types of production, coordination, and regulation. The size of initial capital investments, the degree of vertical integration, and governance within and between enterprises may all vary

47. This most closely resembles the roles of “midwife” and “husbandry” as described by Evans in *Embedded Autonomy*, 13–14.

Table 1.2. Patterns of Enterprise Development

	Beijing	Shanghai	Xi'an	Guangzhou
Ownership Structure	Hybrid	State-owned	State-owned and hybrid	Private
Enterprise Size	Mainly small	Large	Mainly large	Small
Managerial Authority	Founding individuals	Bureaucrats	Founding individuals, bureaucrats	Founding individuals
Type of State Contact	Financial support + supervision	Financial support + meddling	Financial support + meddling	Limited financial support + no meddling

based on the needs of the technological sector. Software producers, for example, are generally independent enterprises that compete with other developers for investment. Investment does not have to be all at once, but can come in distinct stages. Enterprises often adopt a “flat” organizational structure, trying to reduce the barriers between the market and the enterprise, and they often rely on horizontal and informal ties to other enterprises to provide access to highly specialized but complementary knowledge about production, markets, and innovation. In contrast, semiconductor manufacturing is more like a traditional industry. Innovation in the sector has slowed and manufacturing requires huge initial investments, a high degree of vertical integration, and a hierarchical organizational structure.

Enterprises in Beijing were linked to a wider range of supervisory agencies at all levels of government, but they have gradually become more autonomous of the central and local government than their counterparts in Shanghai. The supervisory agency officially in charge of the enterprise was in the minority on the board, and the percentage of profits the agency can claim was shrinking. Individual managers began management reforms, diffusing product authority through the enterprise and encouraging relationships between related tasks. Moreover, dense social horizontal networks linked enterprises to each other and to local institutions, encouraging entrepreneurship and experimentation.

As a result, nongovernmental enterprises were at the center of Beijing’s growth. By 1993 *minyng* enterprises in Beijing made up 10.2 percent of total output value in Beijing. Beijing enterprises were responsible for RMB 6.75 billion in income, 84 percent of the national total generated by nongovernmental enterprises.⁴⁸ Moreover, in 1996, the gross income of the

⁴⁸ Beijingshi Kexue Jishu Weiyuan Hui, 1997 *Niandu Beijing Keji Qiye Gongzuo Yaolan* [1997 overview of Beijing technology enterprises] (Beijing: Zhongguo Jingji Chubanshe, 1998), 70.

total 6,787 *minying* enterprises in all of Shanghai totaled over RMB 17.6 billion;⁴⁹ in Beijing the 4,506 in the zone alone broke RMB 30 billion. Including all *minying* enterprises in Beijing would push the total up to RMB 45 billion.⁵⁰

From 1978 to 1990 over 50 percent of award-winning innovations were based on interorganizational collaboration. The largest type of collaboration within this category was between a research institute and a business enterprise. Legend, Founders, and Kehai would all be classified as this type of enterprise, have all received recognition from local and national science commissions, and all are located in Beijing. In 1988, Legend received a National Award for Scientific and Technological Progress for its Chinese character system; in 1992 its personal computer won the same award.⁵¹ From 1988 to 1994, Beijing nongovernmental enterprises received 32.5 percent of all awards given to national technology entrepreneurs, more than in any other part of the country.⁵² In addition, in 1994 almost two and a half times more patents were issued in Beijing than in Shanghai.

This pattern of development has been conducive to a certain type of IT development. Beijing led the country in software exports from 1996 to 2001 and the capital led in internet start-ups as well. In July 2000, Shanghai had only 8,457 of the mainland's domain-name registrations, 8.6 percent of the whole country, and less than a quarter of the numbered registered in Beijing. The number of internet users in Shanghai was less than 60 percent of Beijing's web population.

Shanghai was dominated by a small number of larger enterprise groups, fragmenting technological networks. Local governments were often able to influence business operations by having a representative on the enterprise board of directors. These enterprises were supposed to have more flexibility in management and market decisions, but the question remains if that was possible with local government representation on management boards. Within the enterprises themselves, authority was highly centralized. These enterprises had few horizontal ties to each other and little conception of themselves as independent actors leading a technological revolution; they remained at the margin of the public-sector economy. Managers were often senior bureaucrats, technological development typically was government directed, and as a consequence enterprises were unable to respond to the rapid changes in the market.

Small, nongovernmental enterprises play a limited role in Shanghai's technology sector. The six largest state-owned enterprise groups generated

49. "Bai jia Minke Qiye Huo Biao Zhang" [Various nongovernmental science enterprises receive praise], *Shanghai Keji Bao* [Shanghai science and technology daily], 22 May 1996, 1.

50. "Shi Yan Qu Gongbu 1996 Jingji Baipishu" [Experimental zone publishes 1996 economic white paper], *Beijing Keji Bao* [Beijing science and technology daily], 17 February 1997.

51. "Lianxiang Jituan" [Prospectus for Legend group], n.d., 6.

52. "Beijing Minying Keji de Chenggong Moshi" [Patterns of Beijing nongovernmental firm's success], *Zhongguo Keji Chanye Yuekan* [Chinese technology industry monthly] 9 (1995): 27-28.

87 percent of total output value in the IT sector in 2000.⁵³ Shanghai has become the country's largest semiconductor producer and leads in the manufacturing of IT machinery and hardware. Although Shanghai lags in internet start-ups, the local government has played an aggressive role in promoting broadband. Shanghai has emerged as a broadband hub with the most advanced infrastructure in the country.

Xi'an exists somewhere between Shanghai and Beijing. Companies tended to be small, with decentralized management structures and few barriers between marketing, research, and sales. Xi'an's large concentration of universities and research institutes meant that enterprises focused on R&D-intensive development. But the lack of foreign capital meant the most successful enterprises have high product diversity. While older *minyong* enterprises in Beijing gradually formalized their relations with and distanced themselves from their supervisory agencies, enterprises in Xi'an sought closer relations with local authorities. As they grew larger, they attracted the attention of the authorities and formed relations with various branches of the local government.

At the farthest end of the spectrum, enterprises in Guangzhou also tended to be small, but with almost no support from the state. In Guangzhou, funding was funneled away from R&D to more profitable sectors, and cooperative relationships developed through joint ventures. As a result, enterprises focused on the quick profits available in buying and selling already established technologies (often imported), rather than face the risks and uncertainty of developing new technologies.

METHODOLOGY AND CHAPTER OVERVIEW

In this book I examine four cases of high-technology development in one industrial sector: the information industries. Most nongovernmental high-tech enterprises are involved in information technologies, and the sector includes enterprises involved in personal computer, component, and peripherals production, software development, and internet services. High entry cost, high risk, and the continued dominance of central state research labs and factories mean there are few if any private entrepreneurs involved in the development of other technology areas like semiconductors, new materials, or new energy sources.⁵⁴

IT is an extremely useful lens through which to focus questions about government intervention into new markets.⁵⁵ Information industries have influenced production processes in all sectors and make up a growing

53. "Vice Mayor: Shanghai Leads PRC IT Industry," *Xinhua*, 9 May 2000, in FBIS-CHI, 9 May 2000.

54. See Wu Xijun, *Gaojishu: Kuashijie de Zhanlue Wenti* [High technology: The next century's strategic problem] (Jiangsu: Jiangsu Kexue Jishu Chubanshe, 1992).

55. Evans, *Embedded Autonomy*.

share of output in all advanced economies. Moreover, IT is a hard case for any arguments about government intervention. Rapid change, high capital investments, and high risk all make IT an especially difficult challenge, and policymakers, in both the developed and developing world, are increasingly concerned with their international competitiveness in these sectors.

Primary-source information for this book came from more than 120 interviews with local government officials and high-technology entrepreneurs in the IT sector in Beijing, Shanghai, Guangzhou, and Xi'an.⁵⁶ As further context for these interviews, I consulted planning documents, statistical yearbooks, newspaper reports, and articles in specialized journals. As mentioned earlier, the development patterns and success of *minying* enterprises have varied by region, and the cases were chosen to give the full variation on the dependent variable. All four cities wanted to make IT a "pillar industry" (*zhizhu chanye*) of the economy. Shanghai and Beijing both have highly developed S&T resources but adopted different policies toward high-technology enterprises, with the result that *minying* enterprise development lagged in Shanghai. Guangzhou and Xi'an lacked the same resources and turned their attention to nongovernmental enterprises later in the reform process. In addition, local officials in these two cities had to balance municipal development with provincial political concerns. Shanghai and Beijing are both centrally planned cities (*jihua danlieshi*), officially administered by the center; officials in the provinces had different relations with the central government.

The lesson of the Chinese case is that under conditions of political and market uncertainty local governments must provide a certain type of help for technological development. Government intervention is frequently intrusive, but sometimes it can be productive. Without well-developed industrial associations and clear property rights, government actors can bolster individual enterprise capabilities. Local governments can help build non-market institutions that still allow high-technology entrepreneurs to shape the sector. These actions do not substitute for infrastructure development and the consistent enforcement of laws, but government action can be tailored to meet the needs of new enterprises. The Beijing local government was more successful in providing access to capital and technology while maintaining enterprise autonomy. By contrast, Shanghai and Xi'an were more likely to provide too much help, securing loans for large SOEs while interfering with R&D strategies and business operations. Finally, Guangzhou did not provide enough support, ignoring the need of fledgling enterprises for financial assistance or property rights clarification.

If the actions of local governments explain China's variable success in creating high-technology enterprises, what explains the different actions of local governments? After describing the policies that created nongovernmental enterprises, I take up this question in chapter 2. In order to under-

56. Interviews are listed in the appendix.

stand why local governments adopted their strategies, technology policy must be situated within the local political, economic, and social context. This context includes factor endowments, the nature of the links between government and societal actors, and the role of the locality in the national economy. All possibilities were not available to local governments; path dependence played an important role in limiting the development options open to local actors.

Inherited industrial structure can only point to the direction local governments may take, not to the specific path followed. Geography is not destiny, and a material explanation alone is apolitical. Technology policy was made within distinct cultural contexts, shaped by shared beliefs that defined the goals and purposes of technological development. How local governments approached the process of *minying* enterprise creation—which development path they chose to follow—was a political choice. Chapter 2 concludes by examining the implications of local institutional constraints to the larger question of economic transition in China and in the former communist countries of Eastern Europe.

In the next three chapters, the politics of *minying* enterprise development in Beijing, Shanghai, Guangzhou, and Xi'an are described. Chapter 3 focuses on Beijing and its definition of nongovernmental enterprise as small, flexible, and relatively autonomous; local policies tried to institutionalize this definition as broadly as possible. Chapter 4 shows Shanghai much more concerned with the role of state-owned enterprises. *Minying* enterprises were expected to complement the public sector, and local policies provide little industry-specific support for small enterprises. The cases of Guangzhou and Xi'an are contrasted in chapter 5. Both cases started later than Shanghai and Beijing, both cases faced significant disadvantages in terms of factor endowments. In Guangzhou, local officials were more concerned with defining enterprises as private and attracting foreign capital than developing *minying* enterprises as a separate category. And in Xi'an, nongovernmental enterprises have lurched between a local government determined to protect SOEs and one slowly realizing the development potential of the sector.

In the conclusion, I return to the question of technological development and national policy. In order to understand national development, we have to understand local development and local cultures. The state exists not only in central ministries, but also diffused throughout the economy. This local focus also has implications for how we understand development and economic transition in China more generally as well as in other countries. Finally I look at how concerns about technological development have been intertwined with military and strategic issues in East Asia, and especially in China.