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Arms and Autonomy: The Limits of China’s Defense-Industrial Transformation

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China’s defense-industrial base is being transformed by the changing industrial landscape and by government efforts to enhance the capacity of industry to satisfy the ambitious armaments requirements of the People’s Liberation Army (PLA). China is an archetypical techno-nationalist state, but has charted its own course in the pursuit of defense-industrial self-sufficiency. The sensitivity of the issue of dependence is reflected in China’s defense-industrial development. For much of the history of the People’s Republic, China’s defense industry was effectively isolated from external market influences, and remains far less globalized than elsewhere, despite the progressive marketization of research and development (R&D) and production as the importance of commercial considerations in state-owned enterprises (SOEs) increases and authorities seek to harness emerging private-sector industrial capacities to the requirements of defense. The internal contradictions of China’s defense-industrial model pose a major policy dilemma due to the difficulties inherent in attempting to exploit the opportunities provided by transnational processes of technological development and application without undermining defense-industrial autonomy. The nature of its defense-industrial transformation has major implications for China: while commercialization is helping to narrow the qualitative capability gap with other major industrialized states, restrictions on the transnational integration of defense firms constitute a significant obstacle to sustained capacity development.

This chapter examines the structural transformation of China’s defense-industrial base and its evolving defense-industrial strategy as authorities strive to address the requirements stemming from the PLA’s ongoing modernization while minimizing the exposure of defense firms to market fluctuations and politically-driven arms embargoes. It begins by considering the influences on China’s defense-industrial strategy, before examining China’s post-1978 defense-industrial revolution and the implications stemming from its approach to its complex and demanding policy requirements.
DEFENSE-INDUSTRIAL AUTONOMY IN CHINA

China was unique among developing states in that it succeeded in attaining genuine defense-industrial autonomy. While highly prized, this objective has proven very elusive in practice due to the necessity of sustained political support and commitment of resources. That China was able to accomplish this demonstrates the depth of commitment on the part of its leaders and the impact of difficult relationships with its arms suppliers in the past.

Defense-industrial autonomy is a long-established policy objective in China. Defense industrialization has constituted a key pillar of the national security agenda since China was subjected to the attentions of aggressive foreign powers fielding military forces equipped to a standard far surpassing those of China in the 19th century. The development of an indigenous capacity to produce modern arms was central to the Self-Strengthening Movement of the late imperial period. As one Chinese official wrote in 1864, “We must imitate the steamers [i.e. warships] in order to deprive the foreigners of the superiority through the very weapon they depend upon.” A number of arsenals were established in an effort to free China from the need to import arms from the very states that threatened its security. Defense industrialization remained an important policy objective during the tumultuous 1916–28 so-called “Warlord Period” and was pursued by the government of the Republic of China during World War II. Despite determined efforts, China remained dependent on arms imports and often experienced difficulties securing adequate supplies in the face of financial constraints and politically driven arms embargoes.

The importance attached to defense-industrial development did not abate with the restoration of effective central government when the People’s Republic of China was established in 1949. China’s new leaders moved quickly to reconstitute and develop the national defense-industrial base, and emphasized the importance of defense-related technological development in the Common Program of 1950, which served as the initial de facto constitution. China registered impressive progress, and by 1960 it was self-sufficient in many categories of arms. The domestic orientation of China’s defense industries was such that they were considered part of the logistical infrastructure of the PLA. While it would be inaccurate to assume complete unity of purpose on the part of China’s leaders since 1949, there has been general consensus on the necessity of maintaining comprehensive national defense-industrial capabilities.

China’s post-1949 defense-industrial structure was geared toward the objective of autonomy. The government restored existing facilities and expanded its production capabilities using the Soviet Union’s defense-industrial model as a template. The salient features of China’s defense-industrial model included a highly centralized and bureaucratic structure. There was a state monopoly on defense-industrial R&D and production, with SOEs responsible for all production, and R&D the product of state research institutes and state-supported academic institutions. Defense-related R&D and production was closely managed by relevant government ministries.

The security considerations underlying China’s defense industrialization had an impact that extended well beyond the structure of industry. The focus on supporting China’s defense establishment meant that the issue of economic viability did not figure significantly in defense-industrial considerations, though the size of the internal market provided by the
PLA certainly generated substantial economies of scale in many cases. The subordination of economic to strategic considerations was further demonstrated by the extent to which China was prepared to go to preserve its defense-industrial capabilities in the event of a conflict. The "Third Front" initiative, which was pursued from the late 1960s through to the late 1970s, saw the geographical dispersal of defense-related production and R&D facilities to remote areas of central China at great cost in the interest of reducing their vulnerability to attack.

The need to develop autonomous defense-industrial capabilities while recovering from the effects of a century of conflict and civil war discouraged ambitious R&D and production programs. Unlike many developing states, China's leaders were prepared to forego attempting to develop and produce arms approximating—or even approaching—the technological frontiers marked out by the advanced industrial states. A risk-averse nature was a feature of China's defense-industrial strategy that distinguished it from that of the Soviet Union. China's defense-industrial program focused on evolutionary developments of existing arms designs at the expense of pursuing potentially promising but untried developmental paths. China did conform to the classical model of defense industrialization outlined in the preceding chapter of this volume, in the sense that it progressed to more advanced designs entailing progressively higher degrees of local responsibility. In terms of combat aircraft, for example, China began by producing the Soviet MiG-15 under license, and stepped up to reverse engineering Soviet designs such as the MiG-21, before producing derivatives of foreign designs and ultimately developing advanced indigenous designs such as the J-10. The technological bar has been notably lower than in the Soviet Union and other major states, however, with China's sights set on relatively modest objectives. It is noteworthy that, even now, efforts are being made to exploit what little potential remains in the design of the MiG-21 alongside the development of designs such as the J-10.

While Chinese authorities are not alone in valuing defense-industrial autonomy, the extent and vigor with which it has been pursued sets China apart. This has been a constant feature of its defense-industrial strategy that has survived administrative reorganizations and fluctuating funding levels. In most developing states, efforts to promote autonomous defense-industrial capabilities focus on the national production capability, and even this often is limited to coproduction or even the local assembly of foreign designs. In the case of China, this was coupled with interest in developing comprehensive R&D capabilities, albeit of a less advanced nature than those of other major states.

The strength of this objective in the case of China is also reflected in the relative isolation of its defense-industrial base. While Chinese authorities were prepared to accept foreign assistance, including in the form of technological inputs, they were wary of arrangements that had the potential to place China in a dependent relationship. China eschewed long-term defense-industrial relationships after 1960 in favor of the opportunistic exploitation of offshore resources through reverse engineering foreign designs and other forms of illicit technology transfer. The technical missions dispatched abroad by China after 1978 with the ostensibly purpose of procuring arms were soon recognized as attempts to garner technological insights. It was similarly recognized that there was little scope for exporting to China without contributing to its long-term defense-industrial development through technology transfer.
The prioritization of defense-industrial autonomy is a direct consequence of China's treatment by foreign powers during the so-called "Century of Shame" that only ended with the establishment of the People's Republic, and of its experience with the international arms market. Official concern over the scope for meeting the material requirements of the PLA internationally without incurring a high political cost was reinforced by developments such as the Western arms embargo applied between the early 1950s and 1980s; the abrupt loss of access to Soviet arms and defense-industrial assistance after the Sino-Soviet split in 1960, which led to the abandonment of hundreds of Soviet-supported industrial projects and left China with a woefully inadequate capacity for the conduct of R&D; and by the partial Western arms embargo reimposed following the suppression of demonstrations at Tiananmen Square in Beijing in 1989.

China's emphasis on defense-industrial autonomy was more than a matter of making a virtue out of necessity. Bitter experience has driven home the importance of maintaining an independent national capacity for the development and production of arms. China's established defense-industrial model is consistent with its general emphasis on self-reliance (zili gengsheng), which has been considered an "indispensable component" of its security. The speed with which China moved to reconstitute and expand its defense-industrial capabilities after 1949, despite the availability of Soviet arms, was noteworthy. While the secondary importance of technological progress can be attributed in part to China's relatively underdeveloped industrial capacity following a century of civil war and conflict, this testifies to the impact of concern over the political implications of defense-industrial dependence, as developing an advanced defense-related R&D capacity in the circumstances China was in at that point would have required a far more extensive foreign role than its leaders were prepared to accept.

China's defense-industrial strategy provided it with a strong capacity for the large-scale manufacture of a comprehensive range of relatively unsophisticated arms, but with little scope for matching, let alone surpassing, the qualitative capabilities demonstrated by other major states. China's defense-industrial autonomy thus came at a high qualitative cost. China has tended to produce arms that are obsolescent, if not obsolete, and has introduced new generations of equipment long after other major states. Its defense industries proved unable even to maintain their relative position in more sophisticated categories of arms. In the area of fighter aircraft, for example, China experienced absolute progress but relative decline in that it produced the early 1950s-vintage technology J-6 fighter in the 1960s, but by the 1980s only had progressed to producing the J-7, which was based on the Soviet MiG-21 design dating from the late 1950s. This has had major implications for China in terms of the potential utility of the PLA as a policy instrument, and determined China's niche as a supplier of low-cost, low-capability arms in the international market.

CHINA'S MODERN INDUSTRIAL REVOLUTION

China's defense-industrial model only came under threat when the changing strategic environment generated arms requirements that were beyond its capacity to deliver. Its established approach was adequate as long as People's War, with its emphasis on drawing invaders deep into China where they could be defeated by numerically superior Chinese
forces, was regarded as a viable strategic doctrine. China's defense-industrial strategy was not considered adequate in the policy watershed that followed the death of Mao Zedong in 1976 and the subsequent reconsideration of the threat environment, which generated a force modernization agenda that national industry was ill-prepared to support. By the early 1980s, it was acknowledged that the PLA would be relying more on technology.\(^7\) The subsequent formal abandonment of the People's War doctrine and the lackluster performance of Chinese arms in the Gulf War of 1990–91 have meant that technological obsolescence is no longer an option for the PLA, and its arms requirements continue to expand in concert with its ongoing doctrinal development.\(^8\) The revolution in military affairs (RMA) has reached China, with the PLA now seeking to field high-technology forces.\(^9\)

The defense-industrial impact of China's heightened emphasis on advanced arms has been softened by the organizational difficulties and resource requirements involved in transforming the PLA to meet its new doctrinal requirements. The sheer size of the PLA and the extent of the changes required mean that, despite increased defense expenditures and the fact that its reorganization has been underway for some time, this still has far to go. The introduction of modern capabilities is an ongoing process, which has enabled Chinese authorities to focus on meeting the material requirements of a relatively small section of the PLA. Demands on the defense-industrial base will increase, however, as the military reform process deepens.

Concern over the technological competence of China's defense industries has been accompanied by attention to the issue of their efficiency. China's defense-industrial base was characterized by outdated production facilities, overcapacity, unprofitability, and weak accountability.\(^10\) These features are recognized as obstacles to its capacity to respond to the changing requirements of its primary customer, particularly given the budgetary pressures facing the government, which mean that defense-industrial development must compete for resources with other pressing requirements. The prioritization of accelerated economic development from the late 1970s onward demanded resources that otherwise would have been available for defense-industrial development. While the government has been in a position to devote substantial resources to defense-related R&D and production, this evidently has not kept pace with the requirements of force modernization. This deficit has encouraged attention to the issue of the efficiency of the SOEs constituting the defense-industrial base and promoted efforts to more effectively harness the capacity of those that were primarily engaged in meeting the requirements of the civil sector. By the early 1980s, there were renewed calls for "integrating military and civil production."\(^21\)

China's integrated approach to industrial development constitutes a key feature of its current defense-industrial strategy.\(^22\) Chinese authorities have sought to exploit the excess capacity of defense firms to help meet civil requirements, including through technology transfer.\(^23\) Alongside this, the government has recognized the scope for the civil SOE sector to demonstrate useful practices to defense SOEs, as well as providing more direct assistance. Civil SOEs potentially offer invaluable opportunities for accessing militarily relevant dual-use technologies and commercial off-the-shelf (COTS) products through commercial channels. This capacity has grown as civil SOEs have developed their R&D capabilities and have become more active participants in the global economy, and as technological requirements in the civil and defense sectors have converged.
The importance of civil industry in China’s defense-industrial strategy means that recent trends must be examined in the context of its overall economic development. The importance of this has increased as the developmental paths of China’s civil and defense industries have diverged. The pattern of development in China’s civil SOE sector has involved the deepening integration of firms in globalized, transnational processes of R&D and production. This has not been mirrored in the defense SOE sector, where security-driven concern over dependence has limited the scope for this. The civil sector thus serves as a means of accessing globalized industrial processes without incurring the political costs that would result from allowing the defense industry to engage at this level. China’s defense-industrial development is being pursued in tandem with its general economic development as a result of its efforts to exploit the opportunities provided by globalization in this manner.

The changed political environment that resulted from the death of Mao provided space for both economic reforms and for the development of private sector industrial capabilities, which have proven mutually supporting. Heightened attention to economic development has seen considerable emphasis on technological progress and on greater participation in the global economy. This paved the way for the progressive introduction of what is termed market socialism. Rather than involving any definite long-term strategy, this developed gradually from the initial approval for the establishment of operations in a select number of special economic zones (SEZs) by foreign firms, including those active in high-technology product areas. In many cases, Chinese subsidiaries of foreign firms developed into more substantive production facilities and, in some cases, even progressed to undertaking R&D on behalf of the parent firm. Chinese SOEs, meanwhile, were also developing their capacities to participate in the global economy and began to forge ties with foreign partners. There has been increasing Chinese participation in transnational structures for technological development, application, and diffusion as its economy has developed. This has taken the form of project-specific joint ventures and longer-term strategic partnerships, and there is growing interest in the co-development of products for the global market. Chinese-based multinational corporations such as Lenovo have emerged in recent years and are helping to drive this trend.

It is noteworthy that Chinese authorities have permitted these trends to develop in crucial high-technology industrial sectors such as aerospace and information technology (IT). In fact, the development of innovative functional relationships with foreign capability partners has been supported by the Chinese government. It has encouraged collaboration with foreign firms, and in 2001 adopted the “going out” strategy, which encouraged offshore investment by Chinese firms. In the aerospace sector, Chinese SOEs now participate as risk-sharing partners in multilateral R&D programs, such as that for the EC 120 Colibri light helicopter and the Airbus A350 airliner. This is a significant trend due to the importance attached to high-technology industry in terms of China’s overall economic development and its efforts to modernize its defense-industrial base, and demonstrates the perceived value to Chinese policy requirements of extensive engagement of offshore high-technology industry.

These trends have been accompanied by the transformation of the domestic environment for R&D and production. There has been a progressive commercialization of R&D and production as officials and managers have learnt through their collaboration with
offshore industry. This has involved the introduction of measures designed to enhance efficiency and profitability, and efforts have been made since the mid-1990s to develop a more market-oriented R&D system, including through transforming state research institutes into independent enterprises. In 2001, Minister of Science and Technology Xu Guanhua emphasized that research institutes "should make their own ends meet." The Chinese industrial landscape now encompasses what has been termed the quasi-state or quasi-market sector. This refers to the growing number of semi-autonomous firms established by state bodies under what is sometimes regarded as a form of limited privatization. This is not true privatization in that it reflects efforts to draw on the market for capital by allowing enterprises to offer shares rather than any interest in allowing the market to shape these enterprises, but nonetheless represents a significant shift for Chinese economic policy.

These trends, however pale in comparison to the reemergence of the private sector as a significant factor in the Chinese economy. This includes in terms of defense-industrial activities, as noted below. This constitutes a major policy departure for China given its political and economic background and official socialist ideology. This trend and the deepening commercialization of SOEs have been made possible by the success of market socialism as a developmental approach. This has facilitated official openness to the erosion of the boundaries separating domestic from foreign industry. Deng Xiaoping, for example, praised the SEZs as "windows of technology" for China.

These trends, if allowed to progress in the manner they have elsewhere, threaten to undermine the autonomy of China's defense-industrial base. That their impact has been rather less up to this point is evidence of the continued salience of official concern over the political implications of defense-industrial dependence. This is leading Chinese authorities to seek to set the terms in which industry engages the global economy. These terms are intended to preserve the autonomy of its defense-industrial base.

ENDURING CONCERNS AND NEW REQUIREMENTS

The difficult task facing Chinese authorities is how to manage defense-industrial development that meets the arms requirements of the PLA in such a manner that it does not jeopardize the autonomy of the defense-industrial base. Defense-industrial transformation is not being pursued with the intention of relinquishing the central role of the state, nor does it involve a shift away from the traditional emphasis on import substitution. The qualitative arms requirements resulting from interest in developing the capabilities of the PLA compel authorities to relax the standards of defense-industrial autonomy, but this objective has by no means been abandoned. Recognition of the necessity of revising the defense-industrial strategy has been evident since the early 1980s. In 1983, for example, Defense Minister Zhang Aiping conceded that it was necessary for China to access foreign technologies while reaffirming the importance of defense-industrial self-reliance. Support within the PLA for defense-industrial transformation has been evident for some time.

China's defense-industrial transformation has been gradual. This has involved a succession of incremental policy changes, rather than a systematic long-term strategy. National defense was one of the "Four Modernizations" announced in 1975, but market-oriented economic reforms have only gradually and partially extended to the defense-industrial
sector. Early transformative efforts focused on organizational restructuring and managerial changes in order to enhance the efficiency and productivity of defense SOEs. These efforts continue, and have been joined by interest in promoting both greater competition in the defense-industrial sector and collaboration between compatible SOEs. Commercialization is now well established in the defense-industrial base. Restructuring efforts have seen the establishment of semi-autonomous enterprises such as the China North Industries Corporation (NORINCO), as well as significant decentralization. This has been accompanied by some rationalization of industrial capabilities, which mirrors the consolidation trends found in other countries as industry struggled with the contracted post-cold war defense market.

Tension between the imperatives of security and modernization has been manifest in the initially very tentative and still gradual nature of China's defense-industrial "opening up" to the world, which continues to lag far behind that of its economy in general. Despite the similarity of the concerns underlying efforts to revise industrial strategies in the civil and defense SOE sectors, the globalization in the defense-industrial sector remains quite limited. The globalization of China's defense-industrial sector began with efforts to supplement national resources through substantive but still very selective purchases from other states. In some cases, this support was illicit, but China's improving political relationships with Western states enabled it to draw openly on the resources of an expanding range of defense firms. This itself posed no real threat to China's defense-industrial autonomy, but laid the basis for engaging foreign industry at a more basic level in terms of drawing on foreign firms for technical assistance, which was evident by the early 1980s. To this end, the China National Aero Technology Import and Export Corporation (CATIC) established offices in the United States and the United Kingdom by 1982 and SOEs began to send representatives to international arms exhibitions.

The transition from what was basically a Soviet-type defense-industrial base is continuing, but does not correspond to developmental patterns evident elsewhere, despite common concern over spiraling operational and resource requirements. Chinese authorities are resisting globalization in limiting the extent and nature of collaboration with foreign industry and by ensuring that control of key industries remains in Chinese hands. While Chinese officials invited foreign investment in the defense-industrial sector in the early 1990s, the "shareholding reforms" announced by the Commission of Science, Technology, and Industry for National Defense (COSTIND) in 2007 permit this only under certain conditions. Globalization involving the Chinese defense-industrial base is effectively one-way, with approval and support for defense enterprises' efforts to exploit the opportunities this presents abroad, but not for any loss of control or capacity at home. As a result, China's developing defense-industrial capabilities are much more dependent on general economic reforms and the general development of industry than is usual. The principal features of China's present defense-industrial model are outlined in the section that follows.

**THE CHINESE DEFENSE-INDUSTRIAL MODEL**

Rather than the straightforward and static division of labor that formerly characterized the Chinese defense-industrial base, it now features competition between defense SOEs. Recent
years have seen the emergence of an intensely competitive domestic defense-industrial environment, with different enterprises developing competing designs to vie for PLA orders. Chinese authorities support the development of competing arms designs as a means of encouraging efficiency and competitiveness, and are no longer necessarily committed to the preservation of the production or R&D capabilities of a particular SOE. This approach is paying dividends in driving defense SOEs to develop the advanced arms required by the PLA. Unlike the situation elsewhere, however, this is not encouraging them to globalize their operations, other than in the limited sense of acquiring or otherwise gaining access to the resources of foreign high-technology firms. The consequences of this are explored below.

This commercialization of the Chinese defense-industrial base has had unintended—though not entirely negative—effects in encouraging firms to seek to maintain themselves through exports. The increasing importance of commercial considerations of profitability is encouraging defense SOEs to export their products. China first exhibited defense-related products in the West in the early 1980s, and it soon emerged as a major supplier to the Middle East. Recent years have seen increasing interest in exports, with more attention to developing products for the export market and more active marketing by firms such as NORINCO and the Poly Technologies Corporation.

China's role as an arms supplier has evolved in concert with its industrial development and the increasing importance of exports to Chinese firms. Chinese arms transfers are now more economically than politically driven, and there has been a notable transition of China as an exporter of the arms designs that were fielded by the PLA to an exporter of a wider range of arms and a provider of an extensive array of arms-related technologies and services. This reflects both the evolving capabilities of Chinese industry and the crowded nature of that section of the international arms market occupied by states in a position to supply low-cost, low-capability arms. The proliferation of arms developed by defense SOEs with the export market in mind has largely comprised designs offering reasonably advanced capabilities at relatively low cost. China's profile as an arms supplier has come to include supplying components and technologies in support of offshore arms R&D and production programs. These activities have official support due to the obvious benefits that arms exports provide for China.

The growing role of the private sector is an important aspect of the commercialization of China's defense-industrial base. A growing number of privately owned high-technology firms are contributing to state-led defense programs. Though the private sector is not extensively developed at present, current trends suggest that it will continue to expand with the encouragement and support of the government. The government has issued guidelines for private sector defense firms, and it announced in 2006 that it was prepared to subsidize the manufacture of arms by the private sector. The 863 Plan is but one of a number of programs developed for the general support of industry that have considerable scope for contributing to the capacity of private industry to support defense-industrial requirements.

Chinese authorities remain intent on maintaining close control over key activities in order to ensure that the defense-industrial base continues to meet the requirements of the PLA. This is evident at both the domestic and international levels. Successive organizational restructurings have not seen the elimination of supervisory mechanisms in the defense-industrial sector, and a tight rein is maintained on those international activities
that have the potential to affect China’s defense-industrial autonomy. Interest in ensuring the continued capacity of defense SOEs to meet the requirements of the PLA is manifest in efforts to maintain their focus on defense-related activities in an environment of potentially lucrative development and production for the civil market.  

The nature of China’s interstate defense-industrial relationships is also noteworthy. These largely involve states that are far less developed than China in defense-industrial terms, with China assuming the leading role, and are often project-specific. Most programs are limited to the production or even assembly of Chinese arms abroad. Examples include the assistance provided Pakistan to enable it to produce the Chinese-designed JF-17 fighter aircraft. Where defense-industrial collaboration does involve R&D, this is concerned with relatively unsophisticated arms and China clearly is the dominant partner, such as with the K-8 trainer aircraft, which also involves Pakistan. China has entered into a number of project-specific defense-industrial cooperation agreements in the past few years. In most cases, China constitutes the lead nation, partnering with states such as Indonesia and Pakistan. China may be involved on a more equitable level with Russia, however. The Chinese government is most open to substantial collaboration on R&D where this involves designs that are not intended for fielding by the PLA. Framework agreements for general defense-industrial collaboration are much less in evidence, but include an agreement signed with Chile in 1993 and one reached with Indonesia in 2000.  

The Chinese government is notably eclectic in its choice of defense-industrial partners and arms sources. It is prepared to draw on the products and services of the defense industries of a broad range of states, including Israel, with which it has not traditionally enjoyed close political relations. This approach is a common feature of concern over the political implications of dependence on arms suppliers, and serves to lessen the potential influence of any single supplier.

China continues to support the PLA’s modernization efforts though reverse engineering foreign arms designs and looking to offshore industry for an indication of potentially useful technological approaches. The continuing use of these tactics does much to sustain China’s image as a copier of foreign arms, despite the technological competency demonstrated by its industry. Interest in maintaining defense-industrial autonomy has also not stood in the way of procuring arms where this is seen as justified by the capability enhancements that it may provide the PLA.

AUTONOMY AND THE LIMITS OF CHANGE

China’s distinct policy requirements will encourage it to continue on its present course. The globalization of the civil industrial sector is crucial given the government’s approach to both economic and defense-industrial development. Chinese authorities cannot be unaware that a more dynamic and globally connected industrial base is better positioned to provide advanced technologies relevant to the requirements of the PLA, including through leveraging commercial ties with offshore industry. As Feigenbaum notes, “Chinese technology planners now understand defense requirements are thoroughly derivative of commercial developments.” At the same time, however, the dictates of security will continue to exert a restraining influence on this approach.
China's defense-industrial model provides an improved basis for meeting its requirements. It can be expected that China will see a reduction in its traditionally protracted developmental cycles for major arms. An accelerated pace of technological innovation will help to narrow the qualitative gap with the other major industrialized states, but is unlikely to provide the basis for any substantial bypassing of product generations. It is likely that China will improve its reputation as a source of arms that are competitive in qualitative as well as price terms. China has made impressive progress in this direction already with its growing success in exporting arms to what are, for it, nontraditional markets in Latin America, Europe, and sub-Saharan Africa.

While the structural transformation of China's defense-industrial landscape is providing it with more capable and more efficient capabilities, its strategy prevents it from realizing the full potential of its market-oriented economic reform efforts. The continuing requirement for a high level of autonomy encompassing both R&D and production will result in SOEs retaining their central role as the cornerstone of the defense-industrial base for the foreseeable future, for example. This defense-industrial model will require the continuing commitment of far more substantial resources to defense SOEs by the Chinese government than would be the case if it were prepared to be less political in its approach to their operations. Effectively balancing the requirements of the civil- and defense-industrial sectors will require skilful management. The progressive development of the Chinese economy will generate pressures in the private and state sectors of industry that will be difficult to reconcile with the demands of defense-industrial autonomy over the long term.

The most serious implications resulting from China's defense-industrial strategy derive from the nature of its engagement with processes of globalization. The intermediate position of the Chinese government with respect to globalization where the defense-industrial sector is concerned is having an impact on its potential for benefiting from participation in processes of globalization. China's essentially exploitative approach to dealing with offshore industry discourages the development and deepening of collaborative arrangements, and will continue to generate and sustain political opposition to offshore operations of Chinese high-technology industry. While there is openness to Chinese investment in the defense-industrial sector in a number of states, this generally does not extend to the developed industrial states that have the most to offer China. Chinese-owned enterprises are regarded in many cases as front companies for illicit technology transfer in these states. This is generating significant concern on the part of a number of foreign governments on security grounds.

Concern is most evident on the part of the United States, where the issues raised in the Cox Report of 1999 remain salient. The extent to which China's defense-industrial progress has benefited from the activities of the civil sector are recognized in the United States. As a result, China constitutes the major object of attention of the comprehensive regime designed to maintain the defense-industrial advantage of the United States. It has developed extensive regulatory requirements concerning mergers and acquisitions involving American firms by foreign firms that are state-owned where this potentially affects its national security. The Exxon-Florio provision of the Omnibus Trade and Competitiveness Act of 1988 enables the U.S. government to block mergers or acquisitions of firms where there is "credible evidence" that this would have a detrimental impact on national security.
The Committee on Foreign Investment in the United States (CFIUS) pays particular attention to Chinese firms as a result of concern over the defense-industrial implications of the American activities of Chinese firms, and potentially considers all Chinese enterprises to be state-owned due to the difficulties inherent in distinguishing between its state and private sectors. Similar scrutiny is exercised over collaborative arrangements involving Chinese industry, with a negative impact on China's industrial development.

Recognition of the impact of its current approach on its long-term defense-industrial development may prompt reconsideration of this approach, but the price in terms of autonomy will likely prove too high to allow for any significant change. Chinese authorities will continue to face the "autarky-efficiency dilemma" described by Andrew Moravcsik: "the inescapable fact that greater autonomy can be bought only at the price of reduced efficiency in armament production." There is greater potential for concern over the long-term implications of the integration of Chinese high-technology industry in transnational R&D and production processes to encourage a policy shift, if integration reaches the point where China is regarded as too vulnerable to external political and market influences.

CONCLUSION

China is likely to maintain its position as the state that has succeeded in developing comprehensive national defense-industrial capabilities from a very basic starting point, albeit at a high cost in qualitative terms. China's interest in technological progress is unlikely to abate, but defense-industrial autonomy will remain a key policy objective. China's interest in bypassing complete generations of arms is unlikely to be realized as long as it pursues its present approach, though it may well register impressive progress in particular sectors, such as has already occurred in a number of areas like antiship missiles and antisatellite weapons.

The Chinese government has demonstrated that it is prepared to consider major policy shifts in its defense-industrial strategy, and Chinese industry has proven its adaptability to changing government requirements. This suggests that there is considerable scope for China's defense-industrial policy to evolve further as requirements and structural conditions demand.

NOTES

3. See, for example: Chan, Arming the Chinese, 59.


6. It is important to note, however, that some of its key features predate the People's Republic by a long time. See Peter A. Lorge, The Asian Military Revolution: From Gunpowder to the Bomb (Cambridge: Cambridge University Press, 2008), 71.


8. The exception to this was the limited tolerance of private enterprises until about 1956, but this did not involve large firms. See Wang, China's Science and Technology Policy 1949–1989, 43; and Tony Saich, "Reform of China's Science and Technology Organizational System," in Science and Technology in Post-Mao China, ed. Denis Fred Simon and Merle Goldman (Cambridge, MA: Harvard University Press, 1989), 73.


22. This has been reaffirmed in China's most recent defense white paper. See Information Office of the State Council of the People's Republic of China, China's National Defense in 2008 (Beijing: Information Office of the State Council of the People's Republic of China, 2009), 43.
33. Gill and Kim, China's Arms Acquisitions from Abroad, 35.
36. See Gill and Kim, China's Arms Acquisitions from Abroad, 92–93, for an indication of some of the programs involved.
42. See, for example: Sergio Coniglio, "China Develops Stealth Fighter," Military Technology 30, no. 2 (2006): 44.
45. See, for example, Tai Ming Cheung, *Fortifying China*, 215–21.