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安全、全球化與中國的技術民族主義

Open and Closed: Security, Globalization and Techno-Nationalism in
the People's Republic of China (PRC)

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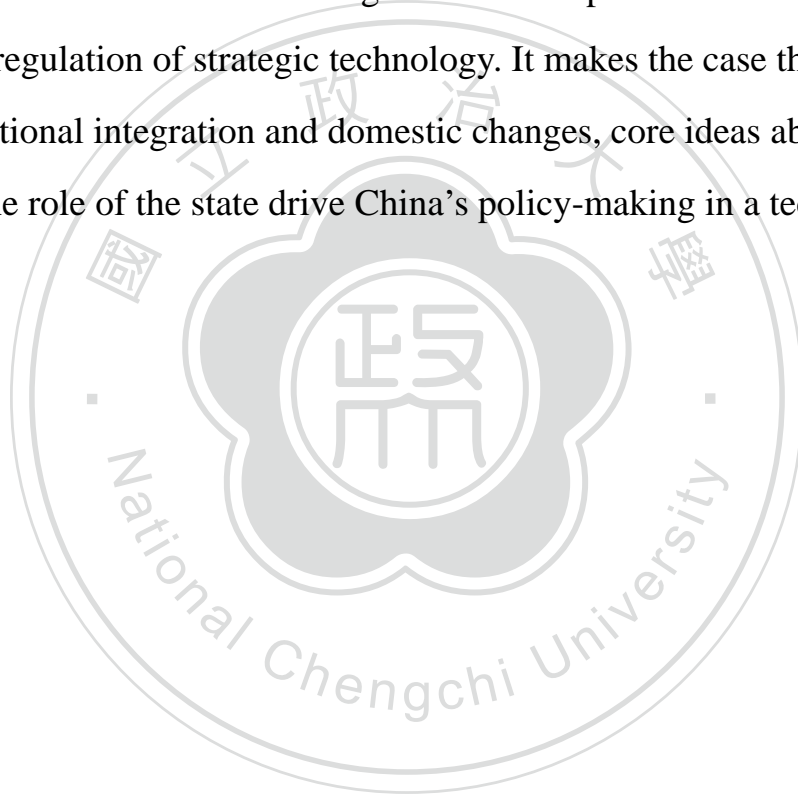
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Abstract

How does the Chinese state conceptualize strategic technology in the age of globalization? This question is of tremendous importance in the context of China's growing international clout. This thesis seeks to provide an answer by examining Chinese technology policy through the framework of "techno-nationalism." It does so by examining the historical foundations and underlying drivers of techno-nationalist ideology: proving applicability to the Chinese context. In doing so it makes the case that techno-nationalist ideology is a salient factor in understanding how China's political elite think about the development and regulation of strategic technology. It makes the case that, in spite of substantial international integration and domestic changes, core ideas about security, sovereignty and the role of the state drive China's policy-making in a techno-nationalist direction.



摘要

中國如何在全球化時代將戰略科技概念化？在中國日益強大的國際影響力的背景下，這個問題尤其重要。本文試圖通過“科技民族主義”框架來研究中國的科技政策並提供一個答案，通過考察科技民族主義意識形態的歷史基礎和根本驅動因素藉以證明適用於中國的情況。準此，藉由通過科技民族主義思想來理解中國政治精英如何看待戰略技術發展和調控此一因素。在此情況下，儘管全球化和國內因素，安全、主權和國家角色思想仍是推動中國科技民族主義決策的核心要素。



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Building up some level of understanding on a topic as consequential as the intersection of Chinese politics and strategic technology has been an immensely challenging and illuminating experience. In preparing this thesis, I benefitted from an excellent committee of advisors who played an invaluable role in enhancing the quality of my scholarship.

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I would also like to thank Professor Hans Tung of NTU for his help throughout the course of this process. Professor Tung's input improved my thinking on both my topic specifically and the process of academic research and inquiry more generally.

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Chapter 1: Introduction

1.1 Introduction

Technology is often depicted as an essential variable informing our study on a range of related fields within the social sciences. As Geoffrey L. Herrera puts it, “technology looms across disciplines as a source of social, economic, and/or political change. It is often the master variable that explains everything.”¹

Accordingly, “technology must be considered an important, transformative element of the international political system.”² These observations, made over a decade ago, seem prescient in light of the current moment. Several recent commentaries convey an acute sense of crisis regarding the existing structure of “international order;” a crisis induced in no small part by the rapidity of technological change.³

One of the seminal areas of interest to scholars of both international relations (IR) and international political economy (IPE) concerns the place of the People’s Republic of China (PRC). Whereas only a few decades ago China was an economic and technological backwater effectively walled off from the outside world, today China is a burgeoning superpower whose “rise” is, in no small part, closely tied up in an aptitude for harnessing new forms of technology in service of both economic development and military modernization.⁴

China’s emergence as a technology power attracts a considerable volume of attention both within the country and without. From semiconductors, AI and ICT software to aerospace, robotics, biotech and sensory technology, growing prowess elicits an array of reactions from a large and diverse array of stakeholders.⁵ That China draws keen interest and close scrutiny reflects its massive scale: it is the world’s second largest

¹ Geoffrey Herrera, *Technology and International Transformation: The Railroad, the Atom Bomb, and the Politics of Technological Change*, 3.

² *Ibid*

³ A prominent example of this argument can be found in Richard Haas, *World in Disarray*, 2017

⁴ See Andrew Nathan and Andrew Scobell. *China’s Search for Security*, 2012.

⁵ Jane Perlez, Paul Mozur and Jonathan Ansfield. “China’s Technology Ambitions Could Upset the Global Trade Order.” *New York Times*. November, 7, 2017.

economy, largest overall exporter, and a leading producer, assembler and consumer of an array of high-tech products and services.

In this light, it can be argued that China is a major stakeholder in the existing liberal trading order; a system of rules and norms widely seen as essential to this period of economic globalization.⁶ Recent statements and initiatives taken by the Chinese government emphasize the ways in which China's economic expansion represents a positive-sum or "win-win" for global development and prosperity.⁷ In one notable example, Chinese President Xi Jinping, speaking at the 2017 World Economic Forum in Davos, laid out the case as such:

Economic globalization has powered global growth and facilitated movement of goods and capital, advances in science, technology and civilization, and interactions among peoples...it is true that economic globalization has created new problems, but this is no justification to write economic globalization off completely. Rather, we should adapt to and guide economic globalization, cushion its negative impact, and deliver its benefits to all countries and all nations.⁸

And yet, despite reassurances that it remains a stalwart of the open trading system, there exists substantial concern over China's utilization of an array of policy tools seen as favoring domestic firms operating in key industries at the expense of foreign alternatives.⁹ Over the past few years there has been a growing backlash against "unfair" policies often seen as coming at the expense of foreign technology providers.¹⁰ This decade-plus long emphasis on promoting domestic technology finds support in state planning initiatives such as Made in China 2025 (MIC) and the 12th and 13th Five Year Plans (FYPs), as well as in important national security and cybersecurity legislation.

⁶ "China supports globalization, free trade: Premier Li." *Reuters*. March 15, 2017.

⁷ "China contributes win-win solutions against counter-globalization." *People's Daily Online*. September 26, 2017. <http://english.gov.cn/news/top_news/2017/09/26/content_281475885630178.htm>

⁸ Xi Jinping, *Speech at 2017 WEF*, Translation from CGTN America <<https://america.cgtn.com/2017/01/17/full-text-of-xi-jinping-keynote-at-the-world-economic-forum>>

⁹ Michael Martina. "U.S. lobby says China protectionism fueling foreign business pessimism." *Reuters*. January 18, 2017.

¹⁰ Keith Bradsher. "Trump's Trade Pick Could Put China in a Difficult Spot." *New York Times*, January 13, 2017

Looking at developments in the country more broadly, it can be argued the past decade upended the belief that China - by virtue of its heightened degree of exposure to foreign ideas, institutions, technologies and people - would move in the direction of greater convergence with an array of Western political and economic norms¹¹; becoming what American official Bob Zoellick famously described as a “responsible stakeholder.”¹² With that in mind, the need for a nuanced understanding of the PRC’s technology landscape has arguably never been more important given the confluence of two major developments: the increasing size, complexity, competitiveness and level of international connectivity within China’s technology market *and* growing contentiousness in China’s security and commercial relations with an array of external powers, principally the United States.

The rapid ascension of China as a major player in the globalized high-tech market comes at a time of heightened debate and potential strategic re-calibration in terms of how a number of foreign capitals approach their relationships with Beijing.¹³ Evan Feigenbaum, writing recently in *The National Interest*, argues that, “China’s rapid military buildup, its unprecedentedly quick industrial and economic development, an increasingly assertive Chinese foreign policy, and new competitive pressures on the United States’ economy and fiscal health” are undermining the belief within Washington D.C. that a “successful” China is in the national interest. He goes on to state that, “among Washington foreign-policy elites and a growing number of U.S. companies, China is viewed as a strategic competitor, a military threat in Asia and, ultimately, a possible adversary.”¹⁴

Chinese technology policy largely feeds into this debate, as evidenced by recent international headlines such as the *New York Times*’ “Political Backlash Grows in Washington to Chinese Takeovers”¹⁵ and the *FT*’s

¹¹ David Shambaugh, *China’s Future*, 2016

¹² Robert Zoellick. “Whither China: From Membership to Responsibility?” *Transcript from U.S. Department of State Archive* <<https://2001-2009.state.gov/s/d/former/zoellick/rem/53682.htm>>

¹³ See Robert D. Blackwill and Ashley Tellis. *Revising U.S. Grand Strategy Toward China*. CFR. April, 2015.

¹⁴ Evan Feigenbaum, Not Since Nixon Has a U.S. President Faced Such a Tough China Challenge.” *The National Interest*, 2017.

¹⁵ Keith Brasher and Paul Mozur. “Political Backlash Grows in Washington to Chinese Takeovers.” *New York Times*. February 16, 2016

“China’s push to become a tech superpower triggers alarms abroad.”¹⁶ The *Information Technology & Innovation Foundation* (ITIF), an ICT industry group, states that “China’s aggressive and unrelenting innovation-mercantilist policies pose a serious and growing threat to both the U.S. and global economy as well as to advanced technology enterprises from the United States and other nations competing on rules- and market-based terms.”¹⁷ As Scott Kennedy notes in a recent *CSIS* report on Chinese innovation, “the most problematic issue in the U.S.-China economic relationship is China’s unprecedented drive to become a technology powerhouse.”¹⁸

1.2 Purpose of the Study

Techno-nationalist ideology, industrial policy, and state planning figure prominently in the academic literature describing East Asian development over the course of the post-World War II period. At various times and to varying extents, every state in the region has been categorized as pursuing a “techno-nationalist” strategy of development.¹⁹ This was the case with China, where the combination of extensive central planning and extreme fear over the nature of the Cold War international security environment drove early PRC industrial policy in the direction of a relatively autarkic form of self-sufficiency principally oriented around indigenous defense production capability.²⁰

However, the reform and opening period commencing in the late 1970s called into question the resiliency of the role of the Chinese state in managing processes of industrial transformation. With the end of the Cold War and the onset of the current phase of ICT-enabled globalization, there emerged a growing belief that the nation-state was losing its saliency as the principal driver of economic and technological development.²¹

Residual attitudes and institutions of Mao-era central planning and communist governance were perceived

¹⁶ Louise Lucas and Emily Feng, “China’s Push to Become a Tech Superpower is Triggering Alarm Bells Abroad.” *Financial Times*. March 20, 2017.

¹⁷ Robert Atkinson, Nigel Cory and Stephen Ezell. *Stopping China’s Mercantilism*. ITIF. March, 2017.

¹⁸ Scott Kennedy and Christopher Johnson. *Perfecting China, Inc.* CSIS. May, 2016.

¹⁹ Tai Ming Cheung. “Economics, security, and technology in Northeast Asia: Maneuvering between nationalist and globalist forces.” *The Economy-Security Nexus in Northeast Asia*, 2013.

²⁰ *Ibid*

²¹ A proponent of this view is Kenichi Ohmae, *The Borderless World*, 1990.

by reformist voices as outdated remnants of a bygone era, likely to be eventually swept away as China further consolidated its transition from socialism to capitalism.²² Yet several decades into the reform and opening period, economic nationalism and techno-industrial policy remain very much in vogue; in China, around the Asia-Pacific, and increasingly in parts of the Western world.²³

This thesis seeks to provide insight into the political rationale underlying China's continuing usage of an extensive techno-industrial policy architecture; a system that, while substantially overhauled and reformulated over the course of multiple decades, persists in the face of comprehensive marketization processes and substantial international integration. In explaining this persistence, the proceeding research focuses primarily on technology at the ideational level - situating technology policy into a broader context of ideas, strategies, and objectives pertinent to central issues of security, power, competition and development. At its core, this thesis suggests that, in the age of globalization, techno-nationalism remains a highly salient framework for understanding how China's political and bureaucratic elite conceptualize strategic technology and develop techno-industrial policy.

1.3 Structure of the Thesis

Chapter 1 provides the introduction; addressing the purpose and relevancy of the research and the principal research questions to be addressed.

Chapter 2 provides an overview of the relevant literature on techno-nationalism and the underlying set of beliefs undergirding it. It specifically examines techno-nationalism within the context of East Asian development. Finally, it examines the phenomenon of globalization and techno-globalism; exploring how the role of the state in technological development is in constant evolution.

²² One prominent critic of this idea is James Mann. *The China Fantasy: Why Capitalism will not bring democracy to China*, 2006

²³ Anthony D'Costa, *Globalization and Economic Nationalism in Asia*, 2012.

Chapter 3 provides an in-depth analysis of the ideational foundations of China's approach to strategic technology. It examines a number of both systemic and contemporary aspects Chinese politics; seeking to provide insight into why successive generations of Chinese leadership have gravitated toward techno-nationalist strategic thinking and why this thinking will likely persist.

Chapter 4 looks at Chinese industrial and techno-industrial policy from the ROC period through to the present. It seeks to establish that throughout modern history the Chinese state has been deeply involved in both protecting and promoting strategically important domestic industries, managing processes of technological development and transformation, and creating institutional structures geared toward bolstering domestic innovation and R&D capacity. Over the course of this overview, the thesis links industrial and techno-industrial policy formation with core techno-nationalist ideas about the nature of security and international economic competition.

Chapter 5 shifts the emphasis of the research from a focus on ideation and policy formation into the realm of implementation and policy interaction. It does so by way of case study; looking at three strategically important sectors: semiconductors, artificial intelligence (AI) and robotics.

Chapter 6 provides the conclusion. It summarizes and attempts to define China's contemporary techno-nationalism in practice and briefly explores possible ramifications of China's techno-industrial policy.

Chapter 2: Literature Review

2.1 Understanding Techno-nationalism

Techno-nationalism describes and conceptualizes the relationship between the nation-state and technology as it pertains to security, development, power, and sovereignty. In this sense, techno-nationalism refers to an ideational framework or guiding ideology rather than a specific set of policies. According to Richard Samuels, author of *“Rich Nation, Strong Army,”* “Technonationalism is an ideology, and like all ideologies it is a force that precedes and informs the institutions of an entire national economy as well as strategies for national security.”²⁴ Although the term first appeared in a 1987 article in *The Atlantic* by economist Robert Reich,²⁵ much of the subsequent research and commentary focuses on industrial policies carried out by East Asian states over the course of the Cold War and post-Cold War period. It is important to note that techno-nationalism belies easy quantification; there is a variation of focus and emphasis within the academic literature. Techno-nationalist strategies of development differ considerably over time, place, and sector.

Despite lacking a uniform definition, Andrew B. Kennedy notes, “there are some common threads in the literature. First, whether the focus is defensive or developmental, there is broad agreement that techno-nationalists see nation-states as engaged in a competitive struggle in which technological prowess is crucial” and that “techno-nationalism can be understood as a belief that technology is a crucial national asset in a highly competitive world.” He goes on to argue that a distinction must be made between “ideological” and “instrumental” techno-nationalist regimes, stating that “pragmatic variants of techno-nationalism are not uncommon, and these embrace a mix of liberal and nationalistic policies in pursuit of national technology goals.”²⁶

²⁴ Richard Samuels, *“Rich Nation, Strong Army.”* 1994, 31.

²⁵ Robert Reich. “The Rise of Techno-Nationalism.” *The Atlantic Monthly*. May, 1987.

²⁶ Andrew Kennedy. “China’s Search for Renewable Energy: Pragmatic Technonationalism. *Asian Survey*. 2013.

Denis-Fred Simon, defining techno-nationalism in 1997, writes that it “is the practice of using technology as a tool of national power in global economic competition, either by trying to withhold technological knowledge from other states or by wielding it aggressively as an economic weapon.”²⁷ For Simon, techno-nationalist patterns of state behavior emerged, to varying degrees, not only in East Asia but also in the United States and Western Europe in response to concerns over economic and military security.

According to the definition provided by David Edgerton, techno-nationalism sees the nation-state as the core unit of analysis for understanding patterns of technological development. Processes of technological innovation, absorption, and diffusion derive from underlying conditions of the nation-state.²⁸ The development and utilization of new forms of technology is deemed essential to welfare and security. Put another way, the success of technological innovation and development is largely contingent on the state while, in turn, the security and material well-being of the state is largely contingent on its technological sophistication.

This framework for conceptualizing techno-nationalism builds upon the work of Christopher Freeman, who emphasized the role of “national systems of innovation” in determining the level of technological and economic development within a given nation-state. Freeman writes that the “national environment can have a considerable influence in stimulating, facilitating, hindering or preventing the innovation activities of firms.”²⁹ In this line of thinking, the structure and orientation of state institutions serves as a key determinant of how a given nation-state utilizes technology and bear heavily upon overall developmental outcomes.

Freeman, in turn, draws on the earlier work of Friedrich List, who advocated an array of interventionist state policies designated to facilitate industrial development, technological upgrading, and innovation. For Freeman and List, the role of the state in market coordination, capital mobilization, and providing support

²⁷ Denis-Fred Simon. *Techno-Security in the Age of Globalization*, 1997, 8.

²⁸ David Edgerton. “The Contradictions of Techno-Nationalism and Techno-Globalism: A Historical Perspective.” *New Global Studies*. 2007.

²⁹ Christopher Freeman, *The Economics of Industrial Innovation*, 1997.

and protection for infant industry in the face of international competition was seen as critical in facilitating technological “catch-up” and overall national development.³⁰ Whereas liberal orthodoxy emphasized the importance of consumer well-being, List shifted the focus of economics toward incentivizing national production in advanced industries. List saw politically-defined “national” boundaries as highly relevant to understanding patterns and processes of economic activity; rejecting the “cosmopolitanism” of free trade in favor of the logic of industrial competition between national economies.³¹ In his view, the state played a critically important role in driving processes of economic/technological development. James Fallows, in summarizing List, writes that, “he argued, a society’s well-being and its overall wealth were determined not by what it could buy but what it could make...in strategic terms, nations ended up being dependent or independent based on their ability to make things for themselves...In material terms, a society’s long-run wealth was greater if it controlled more advanced activities.”³²

List diverged considerably from his intellectual counterpart Adam Smith in doubting the capacity for free trade to facilitate peace amongst inherently competitive and insecure nation-states. Taking a realist approach to questions of trade and development, he emphasized the need for state investment in domestic defense production as a safeguard against external coercion. While such investments in domestic industry may come at expense to individual welfare or overall economic efficiency, they were, in List’s mind, warranted in preserving the vitality of the nation-state and protecting national welfare.³³ Unlike Smith’s emphasis on individual sovereignty and rationality, List, according to Richard Samuels, “appreciated that the economic interest of individuals and the economic interest of the nation might diverge” and, accordingly, “there is a national purpose larger than individual utility.”³⁴

According to Cheng Li, techno-nationalists see technology as playing an essential role in dictating both economic development and in shaping the distribution of power among nation-states in the international

³⁰ Friedrich List, *The National System of Political Economy*, 1841.

³¹ *Ibid*

³² James Fallows, *Looking at the Sun*, 184.

³³ *Ibid*

³⁴ Samuels, “*Rich Nation, Strong Army*,” 6.

system. Implicit to ideational techno-nationalism is the realist view that technology enhances national power in a manner best safeguarding national security within the context of an anarchic and conflict prone international environment. For Li, “techno-nationalism emphasizes the competitiveness among nation-states as the result of scientific discovery” wherein “technological strength is seen as one of the most important determinants of the rise and fall of major power.”³⁵ Tai-Ming Cheung expands on the definition of techno-nationalism, finding a deep intertwining of regime attitudes toward technology and national security. He writes:

Techno-nationalists believe that only a state controlled and closed-door approach to technological innovation can safeguard national security, economic competitiveness, and international status. Emphasis is placed on nurturing indigenous capabilities through the adoption of highly regulated protectionist regimes that sharply restrict foreign direct investment but encourage the one-way importation of advanced technology and knowledge.³⁶

In summarizing the techno-nationalist worldview, technological capabilities are seen, first and foremost, not as instruments for the improvement of individual welfare but rather as tools for protecting the well-being of the collective “nation” as embodied and organized by the institutions of the Westphalian nation-state. In the techno-nationalist view, technology is a core facet of comprehensive national power *and* comprehensive national power is the key determinant of national survival. How a national economy develops and utilizes new forms of technology is therefore seen as an integral component of overall development, sovereignty, and, most critically, national strength.

Political economist Robert Gilpin expounds on the relationship between power, security, and technology, pointing out that “historically there has been a high correlation among technological, economic and political leadership. The rise of particular nations to preeminence – for example Great Britain, the United States,

³⁵ Cheng Li. “Techno-Nationalism vs. Techno-Globalism: East Asia in Search of a New Vision for the 21st Century.” *Institute of Current World Affairs*, 1994.

³⁶ Cheung, *The Economy-Security Nexus in Northeast Asia*, 66.

Germany, and Japan – resulted from their ability to take advantage of the first and second Industrial Revolutions.”³⁷

2.2 Techno-nationalism in East Asia

As Samuels describes the Japanese context: “for more than a century, the struggle to be equal with and independent from the West has animated Japanese technology and security thinking, thinking that posits Japan in a hostile, Hobbesian world in which interdependence inevitably leads to dependence, and dependence eventually results in domination.”³⁸ If techno-nationalism is largely derivative of state perceptions of vulnerability in the face of external threats, the key question becomes one of finding the optimal strategy for achieving technological primacy and autonomy as a means of bettering the prospects for national survival.

Crisis and the specter of external threat were essential causal factors explaining the overall approach taken by Korea, Taiwan and Japan regarding their economic development strategies. Meredith Woo-Cummings writes that the regional experience of colonization, war, and foreign exploitation played an important role in explaining national development strategies geared toward the end goals of both overall growth and technological self-sufficiency.³⁹ The need to build up substantial war-fighting capacity against the tense backdrop of the Cold War security system blended with the domestic imperative of national development in driving all the major state actors in the region toward developmental state models predicated in large part on techno-nationalist principals.

The relationship between nationalism and state security emerges as a recurring theme in examining the governing ideologies taken by East Asian regimes in the aftermath of the Second World War. According to Ming Wan, “the rise of East Asian nationalism was in part a direct response to Western imperialism” wherein

³⁷ Robert Gilpin, *Global Political Economy*, 2001.

³⁸ Samuels, “*Rich Nation, Strong Army*,” 43.

³⁹ Meredith Woo-Cummings. “Back to Basics: Ideology, Nationalism, and Asian Values in East Asia.” *Economic Nationalism in a Globalizing World*. 2005.

“the early modernization drive in East Asia had a clear nationalist basis. Chinese, Japanese, and Koreans recognized the technological superiority of the West, and all sought to borrow Western technologies while maintaining traditional values.”⁴⁰ In this sense, East Asian states internalized the lesson that nation-states compete with one another in the international arena and only through technological mastery could a state best ensure development and preserve its sovereignty and security. In this regard, the ideas of Friedrich List – not Adam Smith – were widely embraced throughout East Asia.⁴¹

Richard Stubbs further reinforces this linkage between external threat and nationalistic state interventionism, arguing that the Cold War security dynamic engendered high levels of regime insecurity, which, in turn, prompted the development of strong state capacity and mass-scale capital mobilization in a manner conducive to rapid industrialization. Stubbs writes that “economic growth was not seen as an end in itself but rather as a means of building the state and increasing the security of the community.”⁴² This cultural and historical context accounts for what some see as a fundamental differences between the Anglo-Saxon and East Asia view of economic activity. James Fallows, writing in *Looking at the Sun*, summarizes these differences as such:

In the Anglo-American model, the basic reason to have an economy is to raise the individual consumer’s standard of living. In the Asian model, it is to increase the collective national strength. Ideally, the goal is to make the nation independent and self-sufficient, so it does not rely on outsiders for its survival. The Anglo-American goal is basically materialistic; the Asian-style goal is basically political, and it comes from the long experience of being oppressed by people with stronger economies and technologies.⁴³

Fallows follows up this insight with several other observations regarding the Asian approach to economic activity. According to him, in pursuing purposeful development strategies, the Asian approach is more

⁴⁰ Ming Wan, *The Political Economy of East Asia: Striving for Wealth and Power*, 2008.

⁴¹ Evidence of this can be found in James Fallows, *Looking at the Sun*, 1994 and in Joe Studwell, *How Asia Works*, 2013

⁴² Richard Stubbs. *Rethinking Asia’s Economic Miracle*, 2005.

⁴³ James Fallows, *Looking at the Sun*, 1994.

comfortable with hierarchy and the concentration of power in the hands of the government than in the Anglo model. In this worldview, government sets the overall direction of the economy and mediates between different stakeholders. Asian states, while more trusting of government power than their Western counterparts, tend to also be more skeptical of market forces; seeing the role of the state as crucial to reigning in excesses and correcting market failures.⁴⁴ The neoliberal assumption that the market “knows best” is not a commonly held view in East Asia. Rather, East Asian governments hew closely to the idea of purposeful state action as a catalyst for technological change and national development.⁴⁵

Finally, the Asian model of economics places an “enduring emphasis on national borders” wherein there is a clear-cut conception of a “national” economic interest transcending the individual citizenry.⁴⁶ The heightened salience of national boundaries holds within it a competitive conception of economic activity: nation-states compete with one another for wealth and power. As Fallows describes it:

Anglo-American *theory* instructs Westerners that economics is by nature a “positive-sum game” from which all can emerge winners. Asian *history* instructs many Koreans, Chinese, Japanese, and others that economic competition is a form of war in which some win and others lose. To be strong is much better than to be weak; to give orders is better than to take them. By this logic, the way to be strong, to give orders, to have independence and control, is to keep in mind the differences between “us” and “them.”⁴⁷

To that end, empowered national development bureaucracies carried out activist intervention in the domestic economy, often taking what Wan categorizes as a “paternalistic” approach toward the management and regulation of private enterprise. Nationalist driven ideologies, emerging largely in response to historical legacies of external predation, permeated throughout East Asia, shaping attitudes toward technology and national development. Within this framework of conceptualizing development, security, and state competition, the role of “national” high-technology features prominently.

⁴⁴ *Ibid*

⁴⁵ *Ibid*

⁴⁶ *Ibid*

⁴⁷ James Fallows, *Looking at the Sun*, 231.

The reasoning for this is fairly straightforward: development is essential to national strength and survival *and* technology is integral to national development. As James M. Cypher and James Dietz put it, “it can be said that economic development is indistinguishable from the ongoing application of technological knowledge to production.”⁴⁸ Accordingly, change in technology flows from a combination of importation, innovation and discovery processes which can then be applied to systems of production. As they see it:

The successful introduction of technology into the domestic production process in any country, what we call *domestic innovation*, requires a domestic scientific establishment capable, first, of understanding, processing, adopting, and adapting foreign produced technological knowledge, including machines and tools, to local conditions and, later, of conducting its own research, designing its own experiments, and recognizing the potential, and sometimes, dangers of its own discoveries when applied to the domestic economy.⁴⁹

Building off of List, East Asian states subscribed to the idea that the not all forms of economic activity were equal: some industries were more valuable and/or “strategic” than others for reasons of overall national development and/or national security. Such industries were, from the standpoint of the state, inherently more worthy of targeted interventions. According to Mark Beeson, this led to the conclusion that, “some forms of economic activity are intrinsically more valuable” and that “governments have an interest seeing them occur within their national jurisdictions. The key question then becomes one of whether such activities occur ‘naturally’ as a consequence of market forces, or whether they can be actively encouraged through government incentives or policies.”⁵⁰

Realizing the development, adaptation, usage and dissemination of productivity-enhancing technology was key to long term development and comprehensive industrialization, Japanese planners, as Beeson puts it,

⁴⁸ James Cypher and James Dietz. *The Process of Economic Development*, 380.

⁴⁹ *Ibid*, 380

⁵⁰ Mark Beeson, *Regionalism and Globalism in East Asia: Politics, Security and Economic Development*, 146

“set out to *create* a comparative advantage in industrial production in defiance of Western economic ‘laws’ and orthodoxy.”⁵¹ The imperative placed on doing so was a matter of virtually existential importance, where “a failure to industrialize and adopt productivity-enhancing technology threatened an equally path-dependent vicious circle of declining returns and living standards.”⁵² In this sense, Japan rejected the concept that development and convergence were pre-ordained through free-markets; governments must instead create or “construct” the conditions necessary for modernization through the development of an indigenous innovation and production capacity.

In this regard, the various states of East Asia set about attempting to modernize their economies and safeguard their security through strategies geared toward the achievement of “technological autonomy.” The achievement of such autonomy, according to Cypher and Dietz, required first the development of an “independent technological *learning* capacity” (ITLC) and, eventually the development of an “independent technology *creating* capacity” (ITCC).⁵³ According to them: “Creating an ITLC and achieving technological autonomy is the first step toward greater self-sufficiency, a higher level of domestic efficiency and the creation of an internal dynamic for the economy. It is an ITLC that undergirded the Japanese, Korean, and Taiwanese development successes.”⁵⁴

Samuels, writing on the interplay between the desire for technological autonomy, national security and development in modern Japan, states, “technology, then, was a matter of national security, and a bundle of beliefs and practices that constitute this view can be called “techno-nationalism.””⁵⁵ In spite of drastically overhauling its structure of governance in the wake of defeat during World War II, many of the techno-nationalist assumptions from the previous era perpetuated themselves in the post-war period. For Japanese state planners both before and after World War II, technological self-reliance represented the preferred means of mitigating against an array of external security concerns. Specifically, in order to meet the overarching

⁵¹ *Ibid*, 147

⁵² *Ibid*

⁵³ Cypher and Dietz, 380

⁵⁴ *Ibid*

⁵⁵ Samuels, “*Rich Nation, Strong Army*,” 33.

national imperative placed on convergence and autonomy as a strategy for catalyzing national development and enhancing national security, Japan's prioritized three component parts in its approach to technology: *indigenization* of foreign technology and foreign knowledge, *diffusion* of new technologies throughout the broader national economy, and *nurturance* of Japanese technology firms as well as the broader national system of innovation.⁵⁶

Again it warrants mentioning there is no uniform manifestation of techno-nationalism in practice among the early-industrializing East Asian states. Post-war Japan developed a formidable domestic high-tech industry based on protocols carried over from the Meiji period while largely forgoing the production of defensive armaments and deferring to the United States for the provision of external security. In turn, political elites from China, Taiwan, North Korea and South Korea all embraced some variation of techno-nationalist ideology in the immediate aftermath of World War II despite myriad differences in history, culture, geography and economic structure.⁵⁷ While differing in form and application, core ideas about the relationship between the possession of indigenous technology, development, independence, and state security drove policy in a techno-nationalist direction throughout East Asia. ■

2.3 Techno-nationalism and Globalization: Techno-Globalism, Competition, and the Nation-state

Globalization, the “ongoing, contested process of international economic integration through which flows of trade, investment, technology, and people expansively and intensely interconnect national economies,”⁵⁸ raises questions about the efficacy of the existing developmental state/techno-nationalism paradigm in East Asia. As Beeson writes, “some commentators believe that the state's capacity to influence economic activity has been profoundly and irrevocably undermined by changes in the international political economy.”⁵⁹

⁵⁶ *Ibid*

⁵⁷ Cheung, *The Economy-Security Nexus in Northeast Asia*.

⁵⁸ D'Acosta, 3

⁵⁹ Beeson, 179

Alternative ideas about the relationship between international trade and technological development gained traction in the wake of the Cold-War. Standing in contrast to the state-centric approach to technology embodied in techno-nationalism stands the techno-globalist paradigm. Techno-globalism arose largely in response to fundamental changes in the nature of the international political economy (IPE) over the course of the 1990s and early 2000s and emphasizes the role of bottom up forces and international connections between firms, states, institutions and individuals in the process of technological innovation and development. Describing the techno-globalist approach, Cheng Li writes that, “from the techno-globalist’s point of view, technological development is an international endeavor, a joint product of multinational institutions, universities, research laboratories, and business firms the link scientists and engineers from all corners of the globe through telecommunication.”⁶⁰

Relative to techno-nationalism, innovation is viewed as comparatively positive-sum and collaborative; particular emphasis is placed on the role of technology in breaking down barriers to commerce, communication and innovation. Techno-globalists emphasize technological innovation in positively addressing transnational issues incapable of resolution at the level of individual nation-states. According to Simon, techno-globalism promotes cooperation on R&D and the sharing of technological products across national boundaries out of two distinctive sets of considerations: finding collective solutions to transnational issues of security and development *and* out of belief that transnational cooperation enhances the potential for innovation, production efficiencies and scale economies.⁶¹

According to the logic of the techno-globalist, technology enables processes of globalization. Extending this positive-sum logic, globalization processes brought about via technological innovation facilitate conditions conducive to international collaboration and further technological innovation. Edgerton argues techno-globalists see technology, particularly in the fields of communication and transportation, as displacing the centrality of the state as a core unit of analysis when thinking about both processes of technological

⁶⁰ Li, “Techno-Nationalism vs. Techno-Globalism: East Asia in Search of a New Vision for the 21st Century.”

⁶¹ Denis-Fred Simon, *Techno-Security in the Age of Globalization*, 1997.

development if not international relations more broadly.⁶² We can argue one of the key features of the techno-globalist worldview is an opposition to the idea of the nation-state as the key unit of analysis in explaining technological development.

While globalization throws up challenges to the traditional role of the state in new and profound ways, there is reason to believe the nation-state will remain the primary unit of analysis when conceptualizing issues of both security and economic development. Ripsman and Paul, examining the ways in which globalization impacts the national security state, argue that globalization “has not yet deeply reshaped the security environment or swept away the state as the principal security actor.”⁶³ Gilpin, a political realist, echoes this viewpoint in the context of an increasingly integrated global economy, arguing that the nation-state remains the dominant actor in both domestic and international economics. For Gilpin, if states remain dominant actors then their concerns regarding security, power and independence will continually exert considerable influence over both domestic and international patterns of economic activity. While states must co-exist with an array of sub-national actors, principally Multinational Corporations (MNCs), the interests of the state as a unit of analysis remain preeminent.⁶⁴

This correlation continually informs present-day behavior: states compete with one another for technological leadership as a means of *both* facilitating national development and enhancing national security. As Gilpin puts it:

At the close of the twentieth century and in the beginning of the twenty-first century, the battleground has been located among the high-tech industries of the computer and information economies. This has produced an intensifying competition among the great economic powers for global supremacy in these technologies and, consequently, for dominant political power in the future.⁶⁵

⁶² Edgerton, “The Contradictions of Techno-Nationalism and Techno-Globalism: A Historical Perspective.”

⁶³ Norrin Ripsman and T.V. Paul, *Globalization and the National Security State*, 2010.

⁶⁴ Gilpin, *Global Political Economy*

⁶⁵ *Ibid*, 140

Political realism and economic nationalism therefore remain useful analytical lenses for interpreting state responses to globalization. Notably in East Asia, forces of globalization and regional integration are re-shaping (but not necessarily reducing) the impetus for nationalistic policies. As Anthony D'Costa argues, globalization is - somewhat counterintuitively - unfolding largely in tandem with a renewed economic nationalism; state actors remain compelled to involve themselves in disputes over trade, investment, technology and intellectual property rights. While the methods and strategies evolve over time and across sector, underlying belief in the need for policy activism as a means of protecting, nurturing and promoting domestic enterprises and overall "national innovation systems" remains largely intact.⁶⁶

As D'Costa puts it, "states are therefore not static institutions; through ongoing intervention they learn institutionally how to manage their economic affairs under changing contexts of economic globalization."⁶⁷ Contrary to liberal conceptions of economic globalization, which see globalization as synonymous with a rollback of statism, in the East Asian context the maintenance of a strong state role is a fundamental enabling condition for national economies moving toward greater international integration. In re-evaluating economic nationalism in the face systemic changes in the structure of the international political economy (IPE), a variety of new theories have gained prominence as a riposte to neoliberalism. These new approaches largely reflect a growing awareness of the centrality of technological innovation as the driving force behind economic growth and national development. However, rather than relying on core neoclassical assumptions, the new theories largely emphasize the means through which concerted state action enables and facilitates technological upgrading and innovation.

Chief among the new theories is *Endogenous Growth Theory* (EGT) which rejects the idea of inevitable convergence and stresses the importance of technology and human capital formation as determinative of development outcomes. EGT posits that technology is a separate factor of production from land, labor and capital; staking out a stronger role for national governments in promoting technological development

⁶⁶ D'Costa, *Globalization and Economic Nationalism in Asia*, 3

⁶⁷ *Ibid*, 247.

through investments in education and R&D. As Gilpin puts it, one key take-away from this new theory “is that political, economic, and other institutions – from governments to universities to corporations – can hinder or facilitate technical advance and hence long-term economic growth.”⁶⁸

A second prominent theory, *New Economic Geography (NEG)*, stresses the clustering of economic activity - particularly high-tech industries - in specific cities, urban areas or broader regions. NEG demonstrates that path dependency often leads to a physical agglomeration of “core” industries. Following the logic of the theory, nation-states compete to build up regional cores capable of ensuring national primacy in valuable industries. Nations hosting regional cores in strategically valuable industries therefore find themselves well positioned to maintain their technological and competitive superiority vis a vis national rivals.

As Gilpin points out, the natural centralization and clustering effects of certain industries often leads to a core/periphery structure within the high-tech economy. This inequitable distribution of production inevitably causes friction among competitive nation-states. Gilpin writes that:

In an increasingly integrated world economy in which core/periphery structures spread across national boundaries, the presence of core regions exclusively controlled by a single nation, and of a periphery composed of other nations, will necessarily lead to economic tensions and even political conflict between the dominant core economy and dependent peripheral economies. Escaping economic dependence and achieving political independence is an objective of every society. Core economies wish to maintain their dominant position, and peripheral economies wish to become core economies in their own right.⁶⁹

Another potentially useful theoretical perspective capturing the East Asian approach to trade, technology and industrial policy under conditions of globalization is *Strategic Trade Theory (STT)*. According to Gilpin,

⁶⁸ Gilpin, 116.

⁶⁹ *Ibid*, 122

“the theory of strategic trade theory provides a rationale for nations to use protectionist measures, for subsidies to particular industries, and for other forms of industrial policy to provide domestic firms with a decisive advantage in both home and world markets.” The underlying logic behind STT holds that high-tech markets are often categorized by oligopolistic competition; without state support, new, small-scale firms lack the resources to effectively compete with entrenched technology giants. The theory suggests that both in terms of national development and national security, high-tech sectors should be prioritized for development over more traditional industry.

While debate around the merits of STT as a strategy for development abounds within the academic community, it retains considerable ideological appeal for political actors where, according to Gilpin, “governments around the world certainly believe that support for high-tech industries produces a high economic return over the long term.”⁷⁰ Despite intensive economic integration and trans-national collaboration, nation-states remain actively competitive with one another in calibrating industrial policies capable of best harnessing and developing an array of promising technology sectors. In summarizing the interplay between public policy, technological development, competitive pressure, globalization and growth performance through the prism of the new economic theories, Gilpin finds:

The new growth, location, and trade theories assume, to the contrary, that technology can be and is being, at least temporarily, appropriated and monopolized by its innovators. Private firms and national governments can and do attempt to slow down the international diffusion of the most advanced technologies at the moment when achieving and maintaining control of technology and knowledge have become more and more important factors in economic growth and international competitiveness... These new technologies are so central to economic competitiveness and national power that the struggle to determine which nations will lead and which will follow in development and exploitation of these revolutionary technologies has been intensifying.⁷¹

⁷⁰ *Ibid*, 127

⁷¹ *Ibid*, 139

One final perspective on the interplay between technology, development and national security can be found in the writing of Denis Fred Simon. Simon, writing twenty years ago, argues that “techno-security” must be broken down across three interrelated layers of analysis: at the international *systems* level defined by globalization and regionalization, at the *nation-state* level defined by states with typical notions of national welfare and security, and finally at the level of the *firm* wherein national boundaries are no longer so crucial in dictating the scale and scope of market activity.

In fact, Simon argues that because of the prevalent belief among state actors that the benefits of globalization are not equitably distributed across different states and firms participating in transnational patterns of trade, investment, production, and R&D, “the same forces that are producing cooperation and collaboration at one level may in fact be the root cause of conflict and neomercantilism at another.”⁷² As the preceding section makes clear, processes of globalization are dynamically affecting both the existing system of international order *and* the strategies and behaviors of an immeasurable number of firm-level actors. Globalization is also challenging and re-shaping how national political actors approach issues of security and development.

In spite of this, many aspects of state behavior remain unchanged; ideas, concerns, and policies undertaken by national governments, whether in the name of pursuing “national” development or preserving “national” security, matter considerably. States have not been displaced by globalization and, in most cases, fight tooth and nail to retain their status of place in an environment described by IR scholar Joseph Nye as being simultaneously defined by a “power transition” from US-led unipolarity to multipolarity and “power diffusion” from state to non-state actors.⁷³

Sandro Montesor, examining the impact of globalization on national processes of S&T development, ultimately finds that techno-sovereignty “still matters in those sectors that are more related to the security

⁷² Denis-Fred Simon, *Techno-Security in the Age of Globalization*, 1997.

⁷³ Joseph Nye, *The Future of Power*, 2011

and competitiveness of one country” and that “‘techno-national’ systems of innovation therefore still matter.”⁷⁴ Both ideationally and institutionally, techno-nationalism is widely seen as still relevant in East Asia today despite systemic changes in the nature of the global economy.⁷⁵



⁷⁴ Sandro Montesor. “Techno-globalism, techno-nationalism and technological systems:organizing the evidence.”*Technovation*. 2000.

⁷⁵ For an argument in favor of techno-nationalism and the developmental state remaining highly salient to understanding East Asian political economy please see William Keller and Richard Samuels, “Continuity and China in Asian Innovation.” *Crisis and Innovation in Asian Technology*, 2003. Also see Andreas Pickel, “Recontextualizing Economic Nationalism in a Globalizing World.” *Economic Nationalism in a Globalizing World*, 2005. And, finally, in Anthony D’Acosta, *Globalization and Economic Nationalism in Asia*, 2013.

Chapter 3: Techno-nationalism in China

3.1 Understanding China's Techno-nationalism

As documented in the preceding section, over the course of the 20th century through to the present day, East Asian states have, in various ways, embraced a techno-nationalist worldview prioritizing the development of indigenous capabilities while protecting strategic sectors of the economy from foreign ownership, influence, and control. This worldview, rooted in a desire for achieving technological independence as a means of ensuring the development, sovereignty and security of the collective “nation,” appears throughout the analysis of East Asian development. While the specific policy contours evolved considerably over time, place, and sector, such core ideas remain deeply entrenched through to the present day.

In defining techno-nationalism for the duration of this thesis, we can see it as being composed of several related components:

- The idea there is a “national interest” - synonymous with the nation-state - transcending the specified interests of the individual or the firm.
- The idea that nation-states *compete* with one another (both commercially and geo-strategically) in a conflict prone international system and that only through power maximization can an individual state best safeguard its national/regime security.
- The idea that technology is a crucial driver of national power and, by extension, national security and sovereignty. As such, not all economic activities are equal: some are more “strategic” than others. For the nation-state, some sectors must be prioritized for reasons of national security and/or the benefits they confer to the broader “national” economy.
- The idea that state action facilitates technological/economic development; state interventionism can “construct” comparative advantage in strategically important industries. As such, the

development of high tech industry shouldn't be left strictly to market forces.

- Accordingly, states should strive for technological autonomy and indigenous aptitude in “strategic” industries as such objectives comport with the overall “national” interest as it pertains to both development and security.

There is evidence suggesting these techno-nationalist attitudes continually exert significant influence over the maintenance, construction, and execution of public policy in China today. An array of existing academic literature utilizes techno-nationalism as an analytical categorization for making sense of China's approach to technological development. For example, Segal and Naughton argue, “notions of technonationalism are still relevant in China, even as it moves toward reduced government steerage of the economy.”⁷⁶ Cheung, writing in the context of China's defense industry, argues that “a techno-nationalist perspective that views technological development as central to the country's national security and economic prosperity shapes the Chinese approach to technological catching up in the defense and strategic sectors of its economy.”⁷⁷

However, what also comes across in holistically assessing the relationship between the Chinese state and technological development is a system with no regional or international analog; China retains an extensive yet ever-evolving techno-industrial policy infrastructure while simultaneously differentiating itself from its East Asian peers in distinctive ways.⁷⁸ While China is undoubtedly becoming a global epicenter of technological innovation, the academic literature regarding the role of the state in promoting high-tech development remains contested. Despite ongoing debate over the efficacy of China's overall techno-industrial policy approach, this structure – embodied most closely in programs like the 2006 MLP, Made in China 2025 and conceptions of “cyber sovereignty” – enjoys high level political buy-in, most notably from President Xi Jinping.⁷⁹

⁷⁶ Barry Naughton and Adam Segal. “China in Search of a Workable Model: Technology Development in the New Millennium.” *Crisis and Innovation in Asian Technology*. 2003. 53.

⁷⁷ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy*, 2009.

⁷⁸ Andrea Boltho and Maria Weber. “Did China Follow the Developmental State?.” *The European Journal of Comparative Economics*. 2009.

⁷⁹ See Xi Jinping, *Governance of China*, 2014

This thesis posits a principal reason for this is ideational; China promotes indigenous strategic technology because, like its East Asian peers, the uppermost echelons of the ruling Chinese Communist Party (CCP) subscribe to techno-nationalist ideas regarding the interplay between “national” technology and national (regime) security. This worldview sees external dependency as a point of strategic vulnerability to be transcended. Put another way, technology is instrumental; tools to be put in service of the party-state’s principal focus on survival – in the face of both internal and external threats.

Further in keeping with traditional techno-nationalist thinking, China’s political elites largely eschew aspects of market liberalism, preferring to see a pro-active state as enabling technological development rather than inhibiting it. State institutions determine the national system of science and technology, which, in turn, determines the country’s innovation potential. Targeted interventions – protecting and promoting domestic technology providers – are widely believed to result in better national outcomes than through a laissez faire approach.

Finally, as this thesis explores in greater detail, indigenous technology also fits into a politically constructed ideological narrative; one linking regime legitimacy to ideas regarding national “rejuvenation,” “harmonious development,” and the achievement of the “China Dream.” According to this dominant narrative, technological parity (if not supremacy) is synonymous with the restoration of national pride and Chinese greatness. In this sense, there is an explicit link between technology (the “techno”) and national identity/pride (“-nationalism”).

As Steve Chan points out in the general context of East Asia, while all states desire a combination of security, development, and social stability, there is no universal framework for optimizing the attainment of all three.⁸⁰ States necessarily pursue certain strategies while eschewing others. Furthermore, the three overarching objectives will, at times, require tradeoffs between one another: growth may undermine social stability; the pursuit of external security may come at a cost to material welfare; shoring up internal stability

⁸⁰ Steven Chan, *East Asian Dynamism: Growth, Order, and Security in the Pacific Region*, 1993.

may undermine relations with foreign actors etc. etc. This is relevant to contemporary China, where successive generations of leadership attempted an oft-uneasy calibration between these three imperatives. The nature of China's history and culture, its political system, and position in the global security order, frame the manner in which policy making elites make trade-offs and decide on priority and strategy.

In this context, we can see technology - Herrera's "master key that unlocks everything" - as essential to understanding the trade-offs and strategies underpinning China's approach. Economic development, military security, and social stability - the core facets of state survival - all hinge, to a considerable extent, on the manner in which various forms of technology are developed, regulated, and utilized. Unsurprisingly then, questions of technology are also questions of politics and vice versa; technological change affects internal politics and international relations *and* internal politics and external security are imperative to understanding the nature of technological development within the PRC.

What follows is an attempt to unpack the underlying dynamics behind techno-nationalism in the PRC. While clearly distinctive in myriad ways, China shares certain core characteristics with other East Asian techno-nationalist states. As this framework makes clear, the impetus for techno-nationalism in contemporary China stems from a combination of historical/systemic and contemporary factors and includes three components central to state survival: *sovereignty and regime security, development and mobilization, and nationalism/national identity*. By better understanding the manner in which China's political elites conceptualize these issues and challenges, we can better understand the allure of techno-nationalist thinking within the contemporary PRC.

3.2 Sovereignty, Power, and Regime Security

The core idea undergirding ideational techno-nationalism is a fairly straightforward one: techno-nationalists adhere to a realist conception of politics prioritizing the survival of the nation-state above any (and all) other objectives. Techno-nationalism closely intersects with realism because technology is perceived as being

closely linked to many key determinants of state survival: power, security, sovereignty, development and competition. More specifically, possession of “national” technology delivers on core security objectives for political realists: reducing external dependencies, strengthening autonomy and sovereignty, and, most importantly, enhancing security by bolstering comprehensive national power and competitiveness vis-a-vis rival state actors. If China’s governing elites see the world through a realist prism, it stands to reason that attitudes and ideas toward technology will reflect techno-nationalist tenets. To understand Chinese techno-nationalism, the starting point is an understanding of attitudes toward regime security and state survival.

As preservation of the existing internal political order remains the overarching imperative, concern over challenges to internal and external security pervade Chinese political thinking. Nathan and Scobell point this out in their appraisal of China’s national security policy, writing, “vulnerability to threats is the main driver of China’s foreign policy.”⁸¹ David Shambaugh argues that while there exists a wide spectrum of “global identities’ within China today, the predominant worldview is a realist one. In his telling, “Chinese realists take the nation-state as their core unit of analysis. They uphold the principal of state sovereignty above all else, rejecting arguments that transnational issues penetrate across borders. Like realists elsewhere, they tend to see the international environment as archaic and unpredictable - thus placing a premium on building up a strong state that can navigate its own way in the world and resist outside pressure.”⁸² This emphasis on political realism is echoed by Suisheng Zhao, who writes, “pragmatic leaders have displayed a consistently realpolitik worldview. Nevertheless, their preferred ends have predominantly remained the defense of their own political power and the preservation of China’s territorial integrity.”⁸³

That realism is determinative of Chinese political behavior comes across clearly in the work of IR scholar John Mearsheimer. Whereas other scholars see China’s realist behavior primarily through the prism of its own unique history and political structure, Mearsheimer sees in China conformity with generalized patterns of rational state behavior. In his reading, China, like any other state, is driven by fear and an inherent distrust

⁸¹ Andrew Nathan and Andrew Scobell, *China’s Search for Security*, 2012.

⁸² David Shambaugh, *China Goes Global: The Partial Power*, 2013. 31

⁸³ Suisheng Zhao. “Chinese Nationalism and Pragmatic Foreign Policy Behavior.” *Chinese Foreign Policy*. 2004. 84.

of rival states in an international security environment lacking a higher arbiter. China, like any other state, is firstly interested in maximizing the probability of its own survival. To do so, it must build up its share of relative power vis-a-vis other state actors, preserve its sovereignty, and increase its power projection capabilities in order to gain leverage in a world of competing nation-states.⁸⁴

Many China specialists see the country's emphasis on political realism as being deeply informed its unique history and the lessons gleaned by current political leadership from historical experience. Heilmann points this out in his analysis of Chinese politics, writing, "contemporary Chinese politics is saddled by historical burdens that influence the behavior of the country's political representatives."⁸⁵ This sentiment, is echoed by Ming Wan, who writes that, "East Asians bring their historical experience into the analysis of current affairs and into their policy prescriptions."⁸⁶

Deep-seated fears over state collapse, institutional atrophy, social polarization, foreign dependency, and external exploitation are frequently traced back to China's traumatic contact with the outside world in the 19th and early 20th century. A number of specific events - the collapse of the Qing dynasty, the imposition of the unequal treaties, Japanese occupation - undergird contemporary China's focus on projecting national strength in order to prevent a repeat of past humiliations. For Ashley Tellis and Robert Blackwill, China's unique history underpins its gravitation toward a realist viewpoint. They postulate that China's political leadership ascribes to a worldview in which conflict and condition are intrinsic features of human nature and strength represents the best guarantor of national survival.⁸⁷

Realist ideas toward external security have driven successive generations of PRC leadership toward the prioritization of a strong, powerful state capable of safeguarding Chinese sovereignty in the face of external rivals. Here Shambaugh is again illuminating: "China is, in essence, a very narrow-minded, self-interested,

⁸⁴ John Mearsheimer. "Can China Rise Peacefully?" *National Interest*. 2014.

⁸⁵ Heilmann, *China's Political System*.

⁸⁶ Wan, *The Political Economy of East Asia*.

⁸⁷ Tellis and Blackwill. "Revising U.S. Grand Strategy Toward China."

realist state, seeking only to maximize its own national interests and power.”⁸⁸ He goes on to add that, “its economic policies are mercantilist” and it “displays periodic evidence of being a dissatisfied, frustrated, aggrieved, and angry nation that seeks redress against those that have wronged it in the past.”⁸⁹

In this sense, we can argue Chinese leadership sees a strong positive correlation between the maximization of national power and maximizing the probability of executing on the overall grand strategy of national security/survival. In synthesizing the unique and general characteristics of China’s rise in the international system in his book *Interpreting China’s Grand Strategy*, Michael D. Swaine makes it clear that power maximization remains a driving force of China’s international behavior:

Such a turn toward assertiveness could arise because of factors peculiar to the Chinese experience: its historical memory of past greatness and the desire to restore previous eminence; its determination to erase the painful legacy of a century of national humiliation; its desire to recreate the traditional sinocentric world order as a means of regulating the political and economic structures of super – and subordination; its belief that China’s external security in the past was primarily assured by a strong state able to dominate or at least neutralize the strategic periphery; and so on. But, it could also arise as a result of the normal competition in world politics that compels every state to continually seek increases in national power in an effort to preserve security.⁹⁰

This focus on building up a strong state with “comprehensive national power” is an animating principal of Chinese regime behavior and has, from the onset of the PRC era, closely intersected with questions of regarding the protection of promotion of strategic indigenous technology. Technology, a critical driver of overall economic development, represents a means of state strengthening in accordance with the realist focus on state/regime survival. As Aaron Friedberg puts it: “Beijing clearly views economic policy as an inseparable component of its grand strategy, and it appears to be more focused on maximizing China’s

⁸⁸ Shambaugh, *China Goes Global*, 310.

⁸⁹ *Ibid*

⁹⁰ Michael Swaine, *Interpreting China’s Grand Strategy*, 2000.

national power than on improving the welfare of its citizens.”⁹¹

3.3 Globalization and Great Power Competition

That China operates as a realist state attempting to bolster its national power and sovereignty as a means of ensuring national survival is broadly in keeping with the behavior of states throughout the region. These ideas, much as in Korea and Japan, remain in place despite systemic changes in the international economy. While China is constantly accommodating itself to new economic realities, as Yongnian Zheng and Rongfang Pan point out, its “conscious restructuring of institutions in response to globalization helps maintain equilibrium between the interlocking and complementary goals of strengthening national power and economic prosperity.”⁹² However, in spite of myriad changes since China embarked on “reform and opening,” security concerns remain closely tied to questions of technology and many centerpiece laws, rules and planning documents released over the past decade contain language widely construed as reflective of techno-nationalist thinking. Substantial integration with the global economy has done little to reformulated China’s holistic and realist approach to national security.

The current period of Information and Communication Technology (ICT)-enabled globalization correlates closely with China’s rise as an economic and military great power. Yet, according to Adam Segal, globalization brings both opportunities and challenges for the ruling CCP.⁹³ International engagement remains essential for economic development while also posing new challenges to one-party rule along a number of inter-related lines. Regime legitimacy remains closely wrapped up in the delivery of continual growth and better material living standards for the general population. Economic growth, in turn, is contingent upon China’s comparative success integrating its national economy into international production chains. Growth flowing from this successful integration plays an essential role in enhancing both social well-

⁹¹ Aaron Friedberg, *Rethinking the Economic Dimension of U.S. China Strategy*, 2017. 20.

⁹² Yongnian Zheng and Rongfang Pan. “From Defensive to Aggressive Strategies: The Evolution of Economic Nationalism in China.” *Globalization and Economic Nationalism in China*. 2013. 85

⁹³ Adam Segal. “Globalization is a Double-edged Sword: Globalization and Chinese National Security.” *Globalization and National Security*. 2006.

being and state power.

However, interaction with economic globalization leaves China's domestic economy exposed to the types of external shocks that run the risk of creating domestic unrest. Economic globalization processes, by introducing an array of international actors and broader marketization processes into the domestic economy, diminishes and/or challenges state capacity to affect the economy.⁹⁴ This reconfiguration of state, societal and market forces dynamically challenges some of the traditional mechanisms via which the state exerts control over society. Furthermore, China's integration within the international economy opens up new sources of dependency.

Increased international linkages not only challenge national security on economic lines however. With the introduction of certain ICT technologies into China, traditional information monopolies enjoyed by the party-state face new challenges. There is a widespread fear in Beijing that the introduction of new mediums of information transmission provide opportunities for foreign ideas capable of undermining CCP authority to gain traction within Chinese society.⁹⁵

Therefore, China's national security strategy must attempt an uneasy calibration between harnessing those aspects of international trade and economic globalization enhancing state power while simultaneously insulating itself from those aspects of that undermine party-state authority by disrupting state control in the economic and/or information/ideological space.⁹⁶ Calibrating between growth (and national strengthening) through international economic integration and the security risks of compromised national sovereignty comes across in the analysis of Nathan and Scobell, who write that, "China came through the reform and opening process with a net strengthening of both the regime's and the country's security, but it did so by giving up much of the autonomy it had exercised under Mao."⁹⁷

⁹⁴ *Ibid*

⁹⁵ Nathan and Scobell, *China's Search for Security*

⁹⁶ *Ibid*

⁹⁷ *Ibid.*

As globalization undermines the traditional resonance of national boundaries, clear lines of delineation between domestic/external, traditional/non-traditional and military/economic/ideological security concerns are increasingly blurred. This sentiment is captured in the analysis of Susan Craig: “the potential for economic warfare to lead to military warfare, or for external instability to fuel internal instability, or for any convergence of traditional and nontraditional crises, is one of the biggest threats perceived by China’s influential elite. Such a perfect storm would threaten not only territorial integrity and sovereignty, it would push back economic and democratic reforms, diminish China’s international stature, and threaten the very survival of the Communist regime.”⁹⁸

This presents a paradox for the modern CCP. International integration and the usage of ICT are critical drivers of China’s ongoing development and shape its interactions with the outside world. At the same time, the opportunities presented by globalization and the adoption of new forms of ICT technology are reconfiguring China’s security challenges in dynamic new ways; with hard to grasp ramifications for technology policy, social stability, and external relations. In this sense, technological change and international integration are *both* essential catalysts for national development and state strengthening *and* major points of strategic vulnerability.

Recent focus on the regulation and development of the ICT space represents a newly emergent reality: national security can no longer be meaningfully separated from network security. In this light, the Chinese government prioritizes cyber sovereignty as part and parcel of its broader approach to the promotion of the ICT sector. A report prepared for the U.S. Chamber of Commerce entitled “Preventing Deglobalization” delves closely into the ramifications of China’s ICT development strategy, finding that:

The confluence of the Chinese government’s longstanding, strong desire to develop its domestic ICT industry and its growing emphasis on cybersecurity have been enhanced further by the current

⁹⁸ Susan Craig, *Chinese Perceptions of Traditional and Nontraditional Security Threats*, 2007. 20.

leadership's broad conception of national security – vividly displayed since key pieces of a new, more comprehensive national security regime began to emerge in late 2014. Deeply embedded in this broad understanding of national security are cybersecurity and control of the internet.⁹⁹

As Amy Chang writes:

China therefore proposes a distinct method for cyber governance that diverges from Western notions of protective measures, arguing for sovereignty in cyberspace, which would allow China to “control” Internet traffic within its borders. While the Western notion of cyberspace encompasses an open, free flow of information across borders, China’s language on cyberspace specifically employs the word “sovereignty,” implying China’s ability to control its own Internet and administer what happens within its own borders.¹⁰⁰

ICT raises new and serious challenges to the concept of interdependence sovereignty as defined by Stephen Krasner.¹⁰¹ While interdependence sovereignty concerns the movement of any number of goods, services, technology, capital, information or people across national borders, rapid advances in ICT specifically raises new challenges in the political/ideological sphere. Chinese leadership clearly sees the threat of Western-originated political ideas as a potentially existential threat to the legitimacy of the party-state structure. Perhaps the starkest evidence of this can be seen in the internal CCP “Document 9” issued in 2013. The memo lays out seven challenges confronting the CCP within the ideological sphere: the promotion of a western-style constitutional democracy, “universal values,” neo-liberalism, independent civil society, independent journalism, historical nihilism, and questioning of China’s “reform and opening” process.¹⁰²

⁹⁹ “Preventing Deglobalization.” *US Chamber of Commerce*. < <https://www.uschamber.com/report/preventing-deglobalization-economic-and-security-argument-free-trade-and-investment-ict> >

¹⁰⁰ Amy Chang. “Warring States: China’s Cybersecurity Strategy.” *CNAS*. 2014.

¹⁰¹ Stephen Krasner. *Sovereignty: Organized Hypocrisy*. 1999.

¹⁰² *Document 9: A Chinafile Translation*. < <http://www.chinafile.com/document-9-chinafile-translation> >

This repeated emphasis on cyber-sovereignty naturally brings policy into alignment with a techno-nationalist approach to ICT, where China favors domestic providers of core network infrastructure. The deterioration in the relationship with the United States – exacerbated by the Edward Snowden revelations in 2014 – is widely considered a critical moment reinforcing the imperative placed on controlling and restricting foreign access to critical cyberspace network infrastructure.¹⁰³ Fears over efforts at broader Western containment are intermingling with concerns over compromised informational security; driving policy in the direction of prioritizing eventual technical and informational independence.

These concerns over informational/ideological security and regime survival are unique to China’s system of authoritarian governance and intersect with another major point of concern: the bilateral relationship with the United States. While there are an array of competing perspectives and visions within China regarding the current and future state of Sino-American relations, one dominant narrative holds that the United States represents a major threat to the perpetuation of CCP rule, core national interests and the future sustainability of China’s overall economic development.¹⁰⁴

Susan Craig argues that Chinese elite-level discussions of American “grand strategy” flows from the underlying assumption that the US is the international hegemon. As she writes in 2007, “characterization of America as the global hegemon pervades all Chinese perceptions about America today.”¹⁰⁵ She posits that this categorization of America as hegemon leads to two primary assumptions on the part of China’s political elite; that the US will move to check and contain any country capable of challenging its position as the dominant international power *and* that the US will undertake efforts at perpetuating its hegemony by actively interfering in the domestic affairs of other states in hopes of better integrating them into an “American-centric” world order.

¹⁰³ Mirren Gidda, “China’s New Cybersecurity Law Could Cost Foreign Companies Their Ideas.” *Newsweek*. May 31, 2017.

¹⁰⁴ David Shambaugh, *China’s Future*, 2016.

¹⁰⁵ Craig, *Chinese Perceptions of Traditional and Nontraditional Security Threats*

This security imperative shapes how technology is conceptualized by senior political elite in Beijing, leading to fears over sovereignty and interdependence resulting from technological integration and reliance. As Naughton and Segal put it, “the desire to be a modern, powerful country is deeply rooted, and the mastery of technology is a key symbol of success. No matter how closely Chinese technology policy comes to resemble that of its neighbors, it continues to reveal a historically rooted concern with technological autonomy. Chinese technonationalism remains regionally distinct because the Chinese are so concerned about dependence on the United States.”¹⁰⁶

Harry Harding writes that, “the U.S.-China relationship has, in recent decades, been perceived in both countries as having become more competitive, in the economic, normative, and security spheres.”¹⁰⁷ This is, according to Harding, in no small part due to the fact that China is rapidly moving into a competitive position in high-tech industries, reducing traditional complementarities between the two national economies. As a result, technology, security and developmental imperatives are blending together against the backdrop of deteriorating Sino-American relations. As Harding writes:

Increasingly, however, observers in both China and the U.S. are complaining that economic competition is not only intensifying, but is also unfair, and, additionally, inadequately regulated. Some Chinese believe that their country is the target of discriminatory treatment by the U.S., particularly when proposed Chinese investment projects in the U.S. are scrutinized and blocked on the grounds that they involve access to advanced technology or ownership of critical infrastructure. Beijing also complains about continuing American controls on the export of advanced technologies to China...¹⁰⁸

¹⁰⁶ Naughton and Segal, 164

¹⁰⁷ Harry Harding, “American Visions of the Future of U.S.-China Relations” in *Tangled Titans: The United States and China*, 405.

¹⁰⁸ *Ibid*, 393

This is reinforced by the analysis of Dieter Ernst, who writes in the context of Chinese ICT:

There is a widespread concern among China's leadership, especially in the military and the Ministry of Public Security (MPS), that China is exposed to nontraditional and asymmetric threats to national security. Information technology is viewed as a double edged sword. China's resurgence both as an economic and military power challenges incumbent global and regional leaders. China's leadership believes that Western IT systems use product backdoors, system loopholes, and Trojan horses to steal China's national secrets and slow down China's rise as a global economic power.

China's leaders also fear that persistent leadership in IT provides ample opportunities for Western powers to use export controls, control over technical standards, and high licensing fees to stifle China's development and force reliance on Western technology.¹⁰⁹

In accordance with the development and mass-scale adoption of new forms of ICT, China's concerns regarding national security increasingly encompass the arena of cyberspace. The ongoing ICT revolution prompted the embrace of a national development strategy predicated on the concept of "informatization," defined by Amy Chang as "a holistic framework that aims to modernize and transform an industrial society into an information society through the development of information and communication technology (ICT) industries and applications."¹¹⁰

By integrating new forms of smart technology into virtually every facet of the Chinese economy, informatization presents new opportunities for both comprehensive national development and further military modernization.¹¹¹ At the same time, the increasingly digitized nature of the Chinese economy poses

¹⁰⁹ Dieter Ernst. "From Catching Up to Forging Ahead: China's Policies for Semiconductors." *East-West Center*. 2015.

¹¹⁰ Chang, "Warring States." *CNAS*

¹¹¹ *Ibid*

new risks to the state actors in terms of both controlling the flow of information within society and ensuring “network security” in the face of both internal and external security threats. As Graham Webster wrote recently in assessing Chinese IT policy: “efforts to secure and exercise sovereignty over the internet at home are well aligned with a goal to develop leading high-tech industries at home.”¹¹²

3.4 Technology, National Development and the State

That a security-centric realism continually pervades Chinese strategic thinking regarding its international environment is only one aspect of China’s techno-nationalism. Ideas about the role of the state in economic management and technological development also point toward a strong techno-nationalist orientation. As covered in the literature review section, techno-nationalists also believe in the power of state institutions in positively promoting domestic technology in a number of ways: the cultivation of a holistic “national system of innovation,” policy support for domestic champions, and through the restriction of foreign ownership in key sectors. In this sense, techno-nationalist strategies of development aren’t seen as trading growth and efficiency for greater security.

Techno-nationalists reject the trade-off between the two objectives (security versus development) as mutually exclusive, instead seeing them as mutually compatible; a pro-active state *both* guarantees security and enables superior developmental outcomes by ensuring that the national economy remains competitive in leading industrial and technological sectors. Concerted state action is integral in driving processes of economic transformation and overall national development. Put differently, for a state to survive it must develop; for it to develop it must encourage technological transformation; and for technological transformation to occur, the state must lead the way.

¹¹² Graham Webster. “China and the Eight Guardian Warriors of American Tech.” *SupChina*. <<http://supchina.com/2017/03/16/china-eight-guardian-warriors-tech/>>

There is evidence suggesting China adheres to these core tenets of developmental techno-nationalism. This is, at least in part, a reflection of specific lessons China internalized from the relative success of its East Asian peers in successfully developing indigenous high-tech industry. “Visible hand” interventionism, apparent most notably in Japan, South Korea and Taiwan, saw the state both protect and support domestic technology producers in the face of foreign competitors in hopes of developing indigenous capacity in specified sectors.

As Xielin Liu and Peng Cheng argue in a report on China’s Indigenous Innovation strategy for the *East – West Center*, the interventionist approach to innovation “remains popular in China” where “many scholars continue to use these histories in their arguments supporting China’s current indigenous innovation strategy.”¹¹³ This is not to say China strictly adhered to the East Asian “developmental state” model; unlike Japan and Korea, China’s strategy of export-led growth relies more strongly on state-owned enterprises (SOEs) in key sectors while also being much more dependent on foreign direct investment (FDI).¹¹⁴

However, the dominant line of thinking within the CCP contrasts with the dominant liberal view of markets and states as being fundamentally in tension with one another. Arthur Kroeber writes that “Chinese leaders have rejected this choice...the reason is they see economic growth and political power as complementary, not contradictory. The uncontested power of the party makes possible vigorous economic development policies that would be hard to sustain in a more open system; in turn, economic success is the main source of the party’s legitimacy.”¹¹⁵ According to Kroeber, the CCP leadership holds an instrumentalist attitude toward the role of the market. This differs significantly from the “developed economy” norm, wherein markets represent the optimal mechanisms for organizing economic activity and the state plays the role of “rule-setter” rather than active intervener. Kroeber writes that in contrast to the Western paradigm, the “default setting” for economic management in contemporary China is direct control by the state, particularly

¹¹³ Xielin Liu and Peng Cheng. “Is China’s Indigenous Innovation Strategy Compatible with Globalization?” *East-West Center*. 2011.

¹¹⁴ Arthur Kroeber, *China’s Economy: What Everyone Needs to Know*, 2016.

¹¹⁵ *Ibid*

in sectors deemed strategically important to CCP interests.¹¹⁶

The view of China as a “market instrumentalist” seeing marketization as a means of bolstering party-state power rather than an end unto itself comes across in the work of Hsueh, who finds that processes of market reform unfolded unevenly at the sectoral level. In industrial sectors deemed strategically important, the state proactively intervenes in processes of market coordination in a manner contradicting simplistic narratives of China’s economy moving uniformly in the direction of greater liberalization.¹¹⁷ Chinese central state authority remains prominent in many key high-tech sectors which, according to Hsueh, are seen as invaluable to China’s overall technology base and to both internal and external security.

This categorization of China’s approach toward market forces is echoed by Peter Martin, who finds that “Xi and those around him tend to think of markets as an important tool for achieving political ends, but they are clear about the limitations of markets.”¹¹⁸ In his analysis, both economic and political reforms must be placed into the broader CCP project of China’s national rejuvenation. Xi’s efforts to impose greater levels of both political and market discipline are viewed as essential to maintaining the existing governance structure. Ian Bremmer further echoes this analysis, seeing China as exercising state influence over entire sectors of economic activity in a normatively different manner from the variants of capitalism found in North America and Western Europe. According to Bremmer, among others, this emphasis on the role of the state in dictating economic activity merits categorization as “state capitalism,” wherein political considerations trump allocative efficiencies.¹¹⁹

Active state involvement in the promotion of strategically important domestic technology has not gone out of fashion despite China’s significant integration within patterns and process of globalization. Instead, regime frustration born out of an inability to successfully move up the technology value chain has, in certain

¹¹⁶ Arthur Kroeber. “Reform of Prices, Not Ownership.” *CSIS*. 2016

¹¹⁷ Roselyn Hsueh. “Strategic and Nonstrategic Sectors.” *CSIS*. 2016.

¹¹⁸ Peter Martin. “Why Patchy Progress on China’s Economic Reforms is Inevitable.” *CSIS*. 2016.

¹¹⁹ Ian Bremmer, *The End of the Free Market*, 2010.

instances, resulted in a renewed emphasis on state interventionism in accordance with the broader economic ideology of state capitalism. Writing in 2010, Thomas Hout & Pankaj Ghemawat concluded that within China today, “its leaders see state capitalism and the containment of foreign companies as China’s best chance of regaining technological superiority.”¹²⁰

As Morris Bian points out, China has undergone massive systemic change at both the ideological and institutional level in defining the relationship between state and market forces. In spite of this, China remains constrained in executing certain reforms by its path dependency. While institutions of economic governance have been overhauled and reformulated to address new challenges and meet new objectives, Bian argues that “China’s government has displayed an enduring faith in the necessity and efficacy of government-led change. Discussions of economic development have often assumed that the government must take the lead in shaping the process, and this was as true today as it was in the 1920s.”¹²¹ Evidence of this imperative on proactive government management of the economy can be seen in both the 2008 response to the global financial crisis and in weathering turbulence in the Chinese stock market in 2015.

3.5 Technology and Nationalism/National Identity

Another prism through which to evaluate the relationship between technology and the Chinese state concerns the re-emergence of nationalism as a major force in Chinese political and cultural life. While defining the nature of Chinese nationalism is an inherently fraught, there is a widespread belief that nationalism is a crucial tool of regime legitimation; particularly given the gradual displacement of socialist ideology over the past four decades.¹²²

In that light, CCP elites across successive generations of leadership deploy a specific nationalist discourse as

¹²⁰ Thomas Hout and Pankaj Ghemawat. “China vs the World: Whose Technology Is It?” *Harvard Business Review*. 2010.

¹²¹ Morris Bian. “Explaining the Dynamics of Change: Transformation and Evolution of China’s Public Economy through War, Revolution and Peace, 1928-2008.” *State Capitalism, Institutional Adaptation, and the Chinese Miracle*. Barry Naughton and Kellee Tsai. 2015.

¹²² Christopher Hughes, *Chinese Nationalism in the Global Era*, 2006.

a means of building support for the party-state structure in the face of internal reforms and international opening. Put another way, nationalist discourse is a way of holding the nation-state together in the face of the centrifugal challenges of globalization. In this sense, nationalism is synonymous with patriotism and a love of the party-state.¹²³ Suisheng Zhao provides a working definition of this Chinese nationalism, writing that:

Nationalism is an effective instrument for the Communist regime...Chinese patriotism can be understood as a state-centric or state-led nationalism. The Communist state is portrayed as the embodiment of the nation's will and seeks the loyalty and support of the people that are granted the nation itself. The Communist state tries to create a sense of nationhood among all its citizens by speaking in the nation's name and demanding that citizens subordinate their interests to those of the state. Freedom is not for the individuals but for the nation-state. This means all power is given to the rulers of the Communist state...By identifying the party with the nation, the regime makes criticism of the regime an unpatriotic act.¹²⁴

This regime-legitimizing nationalism – rooted in the core idea of the party bestowing security, stability and development upon the Chinese citizenry – logically interacts with the technology in key ways. Since the era of Mao, progress in the fields of indigenous science and technology have been depicted as critical to the CCP mission of national strengthening, development, and preservation of sovereignty. Various leaders opportunistically deployed techno-nationalist ideals as a way of building public (and elite level) support for key initiatives.

This tendency appears over the course of the Deng period, where, according to Christopher Hughes, "Deng Xiaoping himself stressed the linkage between science and technology and national power."¹²⁵ Deng built support for his "reform and opening" by positioning reforms efforts as a way of harnessing the worldwide revolution in science and technology as an opportunity for national strengthening. Hughes sees evidence that

¹²³ *Ibid*

¹²⁴ Zhao, *Chinese Foreign Policy*, 76

¹²⁵ Christopher Hughes, *Chinese Nationalism in the Global Era*, 2006. 32.

subsequent generations of CCP leaders proceeding Deng drew heavily on techno-nationalism as a broad ideological concept due to the fact that, “for the CCP political elite, however, managing the political impact of deepening integration with the international technological revolution was a major challenge under ‘reform and opening.’”¹²⁶ This reliance on techno-nationalist discourse stemmed in no small part, from a fear that the importation of foreign capital and technology would simultaneously bring about “ideological pollution.”

In this sense, techno-nationalism is a critical component of a broader nationalist discourse been used by Jiang, Hu and Xi as a means of validating the role of the party-state in the era of globalization and economic opening. This discourse transcends questions of optimal development and national security strategy. All three leaders relied on techno-nationalism – in both language and policy – as a way of building support for international integration; relying on core ideas about national strength and sovereignty as a means of embracing interdependence.

This is apparent under Jiang, where his core ideological contribution, the “Three Represents,” broke with longtime orthodoxy by elevating private business and science and technology personnel into the party vanguard – seeking them as catalysts strengthening the nation-state. According to Hughes, “by the end of the 1990s, the particular form of Chinese techno-nationalism had become quite explicit in Jiang Zemin’s elevation of scientific and technological personnel to the status of the revolutionary vanguard leading the nation to wealth and power under his ideology of the “Three Represents.””¹²⁷

Evidence of this can also be seen over the Hu-Wen era, where the state more heavily embraced the use of techno-industrial policy geared toward popular techno-nationalist end-goals. According to Ling and Naughton, “political entrepreneurship” in the early stages of the Hu-Wen administration resulted in an embrace of both “indigenous innovation” and the “scientific view of development.” In embracing these core concepts, Hu and Wen combined the power of nationalism with the promise of technological progress as a

¹²⁶ *Ibid*, 34.

¹²⁷ *Ibid*, 34.

way of legitimating their hold on power. This “search for policy orientations that appealed to a wide spectrum of political groupings”¹²⁸ resulted in the promotion of indigenous technology in part because it proved deeply appealing for a number of important political constituencies: the military and security hawks, nationalists, officials uneasy with the extent of liberalization in the late 1990s, as well as reformers keen to see China gravitate toward a more innovation-based economic model.

The linkage between national rejuvenation through the creation of a prosperous society/powerful state and the imperative of developing cutting edge indigenous technology remains an essential component of how Chinese officials discuss and conceptualize national development. This tendency continues well into the Xi period, where conceptions of national rejuvenation and the achievement of the “Chinese Dream” stress the development of independent technical prowess.¹²⁹

In this regard, techno-nationalism fits into a broader pattern of nationalistic discourse used by the party in legitimating itself in the post-Deng era. Regardless of the efficacy of actually techno-industrial policy in bringing about the desired ends of development, sovereignty and security, the ideas animating techno-nationalism resonate deeply at both the elite and public level within China. The dominant, state-centric conception of nationalism used by the party today in building support is deeply tied up in techno-nationalist ideals. In this regard, techno-nationalist discourse and aggressive state techno-industrial policies represent a coping mechanism for the modern CCP; a way of maintaining a hold on the public imagination in an era of rapid change and international integration.

Put differently, the legitimacy of the CCP rests on the provision of generally desired public goods: stability, prosperity, external security, national pride/status. Since the foundation of the PRC, the attainment of such “goods” is closely tied up to progress in scientific and technological development. A core CCP narrative holds such public goods are “provided,” first and foremost, by the party-state. In this sense, if the CCP is the

¹²⁸ Barry Naughton and Ling Chen. “The Emergence of Chinese Techno-Industrial Policy: From Megaprojects to Strategic Emerging Industries.”2013.

¹²⁹ Xi, *Governance of China*

enabler of public well-being, security, and material progress, then it must also position itself as the enabler of the scientific and technological forces driving national strengthening, rejuvenation, and overall development. In this sense, there is a tendency – in both ideas and policy – for leaders to play up techno-nationalism as an important means of legitimizing the entire structure of one-party governance. As Segal and Naughton put it, “the Chinese government is constantly casting about for factors to justify its continuing hold on power and its extensive involvement in the economy...This is especially true when the Chinese government actively promotes a view of itself as the strong defender of China’s national interests and pride.”¹³⁰

3.6 Conclusion

In laying out the Chinese “worldview” on technology, Evan Feigenbaum points to three integral components: technology as a key determinant of national power; the idea that nations compete with one another both militarily and economically; and the imperative for developing indigenous capabilities as a matter of development, security, and national prestige.¹³¹ As this section makes clear, there are a range of underlying systemic/historical and contemporary factors in Chinese political life supporting and sustaining this techno-nationalist worldview on strategic technology.

Global economic integration, marketization, new forms of technology, and China’s rapid pace of development have undoubtedly been catalysts for massive systemic change in terms of China’s overall openness, approach to market governance, and national security outlook. Accordingly, the Mao-era paradigm of extensive state planning and traditional Cold War security concerns is inapplicable to the present context. In spite of this, techno-nationalist thinking remains entrenched; the uppermost echelons of the CCP elite believe the state must play an active role in promoting indigenous technology and curtailing foreign reliance as both a security and developmental imperative.¹³² That China subscribes to techno-nationalist ideas of self-reliance is broadly in keeping with the legacy of states throughout East Asia; many of the same ideas

¹³⁰ Naughton and Segal, 186

¹³¹ Evan Feigenbaum. “The Deep Roots and Long Branches of Chinese Technonationalism.” *MacroPolo*. 2017
<<http://carnegieendowment.org/2017/08/12/deep-roots-and-long-branches-of-chinese-technonationalism-pub-72815>>

¹³² *Ibid*

can be found in the experience of Korea, Taiwan and Japan and remain deeply engrained today within the structures of their respective political economies.

What makes the Chinese case distinctive is threefold: the extent to which the China ceded economic sovereignty by opening itself up for FDI; the nature of its authoritarian party-state political system and the challenges new forms of technology pose to ideological and informational security; and China's position as a rival/challenger to the United States. All of these characteristics distinguish the nature of Chinese techno-nationalism from the variants found amongst its regional peers. As the proceeding section argues, while techno-nationalist thinking remains deeply rooted, the manner in which it is practiced is constantly being adapted and reformulated; setting the same end-goals while devising new policy approaches in accordance with new opportunities and challenges.



Chapter 4: Techno-nationalism and Techno-Industrial Policy

4.1 Introduction

The ideas, events, and institutions shaping China's recent history impose a path dependency on its present approach. However, governance is not strictly captive to past circumstance; China's leadership, position in the international system, level of development, material capabilities, and social norms are markedly different than they were in the early stages of reform and opening. Accordingly, strategies of technological development - as well as broader patterns of marketization - evolved considerably over time in accommodation with new stakeholders and new strategies for development.

However, techno-nationalist remains highly salient in interpreting China's approach to techno-industrial policy. While much has changed, core ideas regarding the interplay between security, sovereignty and technology remain consistent. Techno-nationalist thinking continually shapes policy responses to contemporary issues of both security and development. In fact, as this section argues, the combination of regime insecurity and increasing technological capability may in fact be shifting the ideological balance toward a more avowedly techno-nationalist approach. Writing in July 2017, Evan Feigenbaum identifies the extent of continuity in China's technology strategy over the course of multiple generations of PRC leadership, writing:

For one thing, we need to understand that many current Chinese policies actually have pretty deep roots. It's true, for instance, that much has changed in China's technology-related sectors and industries. A generation has now been educated and nurtured outside the country, including in the innovation culture of Silicon Valley startups. So state-backed industrial policies, top down projects, and strategic schemes aren't the whole story of China's technology and industrial development. And yet they *are* a pretty consistent theme.

Such approaches have persisted and cohered across seven decades amid very diverse conditions—when China emphasized military technology and when it emphasized civilian technology; when it was poor and as it has become richer; when it was pennywise and when its coffers have been more flush; and it's shaped policy under five top leaders (Mao, Deng, Jiang, Hu, and Xi).

In short, we should expect these “strategic” approaches to remain a persistent feature of the Chinese policy landscape—and a focal point for the Chinese Communist Party and state.¹³³

With that in mind, it's important to build up to the current moment through an examination of Chinese techno-nationalisms historical antecedents.

4.2 Chinese Techno-nationalism in Historical Context

Within China, the tight linkage between security, sovereignty and indigenous technology traces back to both the late Qing and Republic of China (ROC) periods. Traumatic contact with the Western during the latter stages of the Imperial period brought with it exposure to new ideas regarding the Westphalian notion of the nation-state as well as a discourse of “modern” political nationalism. These concepts provided both an institutional framework for political organization as well as a set of ideas and ideological beliefs necessary in mobilizing popular support for such institutional construction.¹³⁴

Since the emergence of the “self-strengthening” movement, national strategy centered on the primacy of state power as the surest pathway toward alleviating endemic insecurity. National crisis during the late stage of the Qing period provided the impetus for a Chinese nationalism centered on the desire to emulate the institutions of the modern nation-state.¹³⁵ Central to the imperative of nation-state building was acquiring (then surpassing) the technological primacy enjoyed by Japan and the Western Imperialists. Technology was,

¹³³ *Ibid*

¹³⁴ Yongnian Zheng, *Globalization and State Transformation in China*

¹³⁵ *Ibid*

from the earliest stages, seen as an essential component of national power.

Within the reformist movement, many saw European technological superiority as determinative. Deeply disturbed by the series of both internal and external crises confronting Imperial China, public intellectuals like Feng Guifen advocated for processes of “self-strengthening” wherein China actively borrowed and indigenized foreign practices as a means of building up national capability and “catching-up” with the foreign imperialists.¹³⁶ If Feng’s overarching goal was the construction of a powerful and modern Chinese state capable of warding off foreign aggressors, then his preferred strategy for state-building contained within it the roots of techno-nationalist thought. Feng prioritized military development as the central imperative of the modern Chinese state and pushed for the acquisition of foreign weaponry in the short term as a means to help Chinese learn how to use, manufacture and, eventually, innovate military technology in the longer term.¹³⁷

According to Morris Bian, Republican China’s approach to development drew heavily from the thinking of Sun Yatsen; prioritizing extensive state control and bureaucratic planning with an emphasis on the development of national defense and heavy industry.¹³⁸ Industrialization, under the aegis of heavy state direction, was seen as the preferred means of building up defensive capabilities for safeguarding against further external exploitation. The early ROC saw the improvement of economic welfare as subservient to the central goal of bolstering national strength via military development; ensuring a pathway to safeguarding future independence and sovereignty.

Upon coming to power in 1949, the Communist regime immediately confronted a China both ruined by decades of continuous warfare and facing severe national security challenges requiring swift action. Tai-Ming Cheung, describing the imperative placed on the building up of a technologically modernized and self-sufficient defense capability, writes that “the Communist leadership saw China as being on the front line of

¹³⁶ Orville Schell and John Delury, *Wealth and Power*, 2013.

¹³⁷ *Ibid*

¹³⁸ Bian, *State Capitalism, Institutional Adaptation, and the Chinese Miracle*.

an escalating East-West confrontation and prepared for conflict against an adversary that was armed with both conventional and nuclear weapons.”¹³⁹ Cheung states that military techno-nationalism - largely a reflection of the extensive militarization of the Chinese party-state - was the dominant approach taken by China toward the development of technology in the pre-1978 period. The twenty-year span following the establishment of the People’s Republic saw political decision-making largely monopolized by a military-centric leadership exceedingly focused on regime survival in the face of severe external security threats.¹⁴⁰

Within the upper echelons of the CCP - particularly the PLA - state building, high technology, and national power situated together. Military security prerogatives deeply embedded themselves within the overall PRC approach toward national development, where possession of indigenous technology – principally in the realm of defense – became inseparable from perceptions of national power and prestige.¹⁴¹ The outbreak of the Korean War in particular represents a major causal factor in driving the PRC further in the direction of centrally planned industrialization as a means of bolstering indigenous defense production capabilities. As Feigenbaum writes, “the war revealed to Chinese military leaders a host of larger deficiencies and convinced them of the need for technological modernization virtually across the board”¹⁴²

In this context of profound insecurity, the institutions of state heavily focused upon building an indigenous S&T base necessary in sustaining a modern military deterrent. Early stages of CCP industrial policy followed a Stalinist approach emphasizing the rapid development of capital-intensive heavy industry, wherein many of the institutional structures associated with the development of national science and technology were copied wholesale from the USSR .¹⁴³ To do so, it set up a network of high-tech research institutions focused on the creation of strategic weapons technology. The network centered around the elite Chinese Academy of Sciences (CAS), where substantial volumes of overall GDP were devoted to science and technology R&D.

¹³⁹ Cheung, *Fortifying China*, 23

¹⁴⁰ Cheung, *The Economic-Security Nexus in Northeast Asia*

¹⁴¹ Evan Feigenbaum, *China’s Techno-Warriors*, 2003.

¹⁴² *Ibid*, 23.

¹⁴³ Barry Naughton, *The Chinese Economy: Transitions and Growth*, 2007.

That pre-1978 China opted for military techno-nationalism is not to say that it pursued technological autarky. With the newly installed PRC government effectively boxed out of international markets and lacking a significant domestic technology base, Soviet technology transfers played an integral role in the initial stages of the PRC's industrialization drive. According to Naughton:

The Soviet Union transferred not only the technologies themselves – having a profound impact on every aspect of Chinese industrial and military technology – but also the key institutions that shape incentives to adopt technology. The organizational structure of the entire national system of research and innovation came from the Soviet model, beginning with the elite research institutes of the CAS. This was probably the largest coordinated transfer of technology across national borders ever known.¹⁴⁴

The development of numerous strategically important industries ranging from aerospace and steel to electronics and communication relied heavily on Soviet technology and expertise.¹⁴⁵ In this environment, techno-nationalist thinking shaped the overall strategic framework; setting out an idealized end-goal of extensive industrialization centered upon a fully indigenized strategic weapons program. However, while stressing technological autonomy, domestic weakness necessitated pragmatism, compromise, and continual Soviet dependency. Much as in the preceding Republican period, external importation of technology was seen by state planners as a temporary stop-gap measure; allowing China access to technology necessary for ensuring national security and development until an indigenous alternative could be developed. Growing dependency on Soviet technology in the wake of Korea came to be seen as a major point of vulnerability, prompting further emphasis on developing indigenous strategic weapons technology.¹⁴⁶

To that end, the obsessive focus on military security during this period resulted in defense related research

¹⁴⁴ *Ibid*, 354.

¹⁴⁵ Jean-Christophe Defraigne. "China's Industrial Policy." *ECRAN*. 2014.

¹⁴⁶ Naughton, *The Chinese Economy*

and industrial production comprising a disproportionate share of the overall economy. While massive outlays came at serious cost to public welfare, the military techno-nationalism of the Mao period did result in two notable successes: the development of an indigenous satellite and nuclear weapons program.¹⁴⁷ The prioritization of developing strategic weaponry - one which largely integrated national security concerns into the entire framework for technology and national development - overrode the extensive bureaucratic politicization seen over the course of the Mao period. The upper echelons of the military science bureaucracy were comparatively insulated from the upheavals brought about by the Great Leap and the Cultural Revolution.¹⁴⁸ They were accorded greater academic/research freedoms, drew heavily upon research and expertise emanating from the U.S.S.R., United States and Western Europe, and devoted less professional time to the “political work” commonly emphasized in civilian bureaucracy and academia.

Breakdown in Sino-Soviet relations cut off technological patronage, casting China into a period of premature technological autarky and severely retarding future development from the mid-1960s until the late 1970s. The split imperiled the PRC’s existing technology strategy, one which saw the importation of Soviet products and technical expertise as a way-station toward eventual self-reliance. China’s economy stagnated during this time; lacking alternative partners, deeply in thrall of rigid central planning, highly inefficient, and beset by rampant political upheaval. In spite of the success of the “two bombs, one satellite” strategic weapons program, innovations in the defense sector were balkanized from the broader civilian economy. Technological diffusion was limited and few high-tech products were produced at mass-scale for general consumption.

Despite being a technological laggard, ideological and institutional legacies of Mao-era militarization - principally embodied in the PRC’s approach to developing a strategic weapons program - remained deeply embedded within the overall structure of China’s political economy generations later. For Evan Feigenbaum, author of *China’s Techno Warriors*, “the power of its ideas, coupled with the survival of the strategic

¹⁴⁷ Feigenbaum, *China’s Techno-Warriors*

¹⁴⁸ *Ibid*

weapons elite through the chaos of the Cultural Revolution, made this doctrine and its organizational complement an important legacy for China's leaders as they moved to refocus the country's goals on national economic growth."¹⁴⁹

4.3 China's Technology Policy under "Reform and Opening"

Developments in the late 1970s suggested an acute awareness regarding the limitations of the existing economic structure in facilitating technological development. Under Deng and Hua, China embraced a newfound strategy for comprehensive modernization across four key sectors: industry, agriculture, military, and science and technology. Dubbed the "Four Modernizations," the new program aspired for China to reach the status of a fully modernized socialist state by the year 2000. In doing so, China turned away from the autarky of the late Mao period, embracing the importation of foreign technologies, capital and technical expertise in a transformative way. The program set about empowering a more technocratic and modernized bureaucracy and welcoming some level of market competition and foreign direct investment (FDI) as a means of driving technological advancement and overall national development.¹⁵⁰

However, in moving away from a centrally-planned economy oriented around a militant form of techno-nationalism, Chinese leadership proceeded cautiously and gradually in the early stages of the "reform and opening" period. Marketization, the selective cultivation of FDI and a general trend toward managed opening to the world didn't represent an embrace of economic or political liberalism. Nor did it represent a full repudiation of techno-nationalist thinking rooted in concerns over national strength and sovereignty.

Rather, the impetus for reform stemmed from a desire to find a workable framework for preserving the wounded partly-state political monopoly by jump-starting the moribund economy through the injection of capital and new forms of technology. In this sense, tentative movement toward economic liberalization was

¹⁴⁹ Feigenbaum, *China's Techno-Warriors*, 68.

¹⁵⁰ Richard Baum. *China's Four Modernizations: The New Technological Revolution*. 1980.

seen by many within the CCP ruling elite as necessary for the illiberal ends of preserving CCP hegemony and building up state power.¹⁵¹ By opening itself up to the outside world, Deng and his allies were not rejecting techno-nationalist end goals but farther pursuing them in accordance with a new strategy of foreign learning.

China's framework under Mao stood in contrast to the more commercially driven techno-nationalism seen in Japan and South Korea; where private firms developed, acquired and integrated foreign sources of technology with the end goals of building up internationally competitive export sectors and a stronger domestic technology base.¹⁵² The comparative success of rival East Asian states along China's periphery provided an important "demonstration effect" for the CCP leadership eyeing a new approach while simultaneously underscoring the extent of China's technical backwardness.¹⁵³ At the onset of China's reform and opening period, Japan - devastated in the aftermath of World War II - had already established itself as the second largest economy in the world.

Starved for capital and technology, China's development strategy underwent profound structural change after Deng Xiaoping consolidated his position within the party leadership. With China's geopolitical situation improved via rapprochement with the United States in the latter stages of the Mao-period, Deng possessed greater latitude for moving in the direction of de-militarization; shifting economic development away from its overwhelming focus on heavy industry and toward the civilian economy. The decision to undertake massive reforms is widely interpreted as a response to China's relative backwardness as well as reflection of the fact that the existing approach – largely rooted in militant techno-nationalist principals of heavy defense-oriented development – failed to deliver desired development outcomes. With Deng undertaking extensive political and economic reforms, R&D declined significantly as an overall share of GDP. China moved away from the military-centric development model and toward greater marketization and FDI cultivation.¹⁵⁴

¹⁵¹ Nathan and Scobell, *China's Search for Security*

¹⁵² Cheung, *The Economic-Security Nexus in Northeast Asia*

¹⁵³ *Ibid*

¹⁵⁴ Naughton, 2007

One primary manifestation of China's newfound approach to technological acquisition during this period can be seen in its approach to Foreign Direct Investment (FDI). Whereas FDI did not serve as a key component of East Asian development in the Japanese or Korean context, China set up special economic zones along its coast in hopes of attracting foreign capital needed to create jobs and revitalize its domestic manufacturing base. By encouraging FDI flows, China compromised substantial degrees of its economic sovereignty in a manner distinct from its East Asian peers. China - situated outside the US security structure - didn't enjoy the same level of privileged access to Western markets as its East Asian peers. This geopolitical reality played an important role in compelling a more open and accommodating approach to FDI as a means of securing foreign technology and investment.

That China - an ideological rival of the American-led trade and security bloc - opened itself up to trade and investment from abroad unnerved many within the country who felt that economic re-orientation both compromised Maoist ideology and created new security risks by increasing external dependency. Given the CCP's aforementioned ideological and institutional legacies, it's unlikely senior leadership saw "reform and opening" as a pathway to eventual political transition away from the socialist party-state model.¹⁵⁵ Rather, it seems likely that reforms were undergirded by a pragmatic recognition; by allowing in foreign capital and expertise, China gained access to new forms of technology necessary for both national industrial development and military strengthening. The justification for "reform and opening" was couched in the language of acquiring foreign sources of technology and building up national strength, not in embracing a normative liberal transformation.¹⁵⁶

Internally, economic reform played out gradually and encompassed several core components. The most significant alternations in the approach to economic governance taken by the CCP in the reform era include: a significant retrenchment of the state's overall role in economic planning; the toleration and encouragement of private enterprise; the reform of state-owned enterprises; market determined pricing for an array of goods

¹⁵⁵ Kroeber, 2016

¹⁵⁶ Hughes, 2007

and services; pro-market patterns of state intervention; and the adoption of a legal framework conducive to market processes.¹⁵⁷ From the bottom-up, private sector led economic development, international integration, and access to new forms of technology, principally ICT, brought about drastic changes in the nature of the broader Chinese society.

However, in spite of myriad change, aspects of China's techno-nationalist orientation remained largely in place over the course of the early reform period. China's reforms – while substantial – remained constrained by the ideological and institutional strictures of the pre-existing CCP-state system. Despite the emergence of a variety of heterogeneous and influential new political actors, historically embedded patterns of state control and central planning, particularly as they pertained to the role of the state in acquiring, developing and regulating politically strategic technology, remained largely in place and acted as breaks on further processes of market reform.

As Naughton and Segal point out, during the early stages of reform the government embraced marketization processes in low-tech, labor intensive areas of the economy while maintaining tight control over strategically important sectors of the economy. FDI, while encouraged in certain sectors, was initially channeled into specified enclaves where it could be more easily managed and controlled.¹⁵⁸ In this regard, China's economic nationalism during the time period can be described as “defensive” in nature; concerned with preserving sovereignty by walling off and protecting strategically important industries from external competition and/or control.¹⁵⁹

Initiatives like the strategic “863 Plan” unveiled in 1986, and the more commercially oriented “Torch Plan” unveiled in 1988, underscored continual reliance on central planning in shaping China's S&T environment. Feigenbaum construes such initiatives as evidence that “China remains wedded in many ways to “planned” innovation from the top down” where, “ultimately, the end goal of strategic guidance plans such as 863 is to

¹⁵⁷ A comprehensive analysis of China's economic reforms can be found in Dali Yang, *Remaking the Chinese Leviathan*, 2004

¹⁵⁸ Naughton and Segal, 2006

¹⁵⁹ Zheng and Pan, 2013

create an indigenous Chinese capability to innovate and manufacture.”¹⁶⁰ While Deng pivoted techno-industrial policy away from the strict focus on weapons technology, he still hewed closely techno-nationalist ideas regarding the importance of the state in helping China close the technology gap with its foreign competitors. State guidance and policy support in the high-tech arena remained essential for Chinese security and economic competitiveness.

Complicating liberalization efforts were voices amongst the “New Left,” who saw the intrusion of foreign MNCs into the Chinese market as eroding national sovereignty and threatening the development of China’s domestic industrial base. The 1990’s seesawed between bouts of market reform and renewed commitments to nationalistic protections as a means of insulating Chinese firms (and the broader national economy) from the instabilities of globalization. In summarizing the period, Zheng and Pan write that, “Chinese opening and integration into the global economy at this stage was characterized by a tug of war between economic liberalism and economic nationalism...To be accepted by the international community, the Chinese state had made concessions by opening its door wider, but it managed to exchange market access for other benefits, especially high technologies of MNCs.”¹⁶¹

Concerns over China’s innovative abilities grew over in the late 1990s, culminating with the 1997 CAS report entitled “The Coming of the Knowledge Based Economy.”¹⁶² The report emphasized the need for China’s political leadership to invest more heavily in strengthening the national S&T ecosystem; linking economic and security competitiveness with high-tech innovation. The report drew keen interest from senior leadership within the CCP, most notably from President Jiang Zemin, who began utilizing the language of high-tech innovation in speeches and public statements setting out China’s future strategy.

In contrast to the rigidity of the Mao-era, the period from 1978 through 2000 demonstrated a high degree of adaptation and improvisation in China’s approach as it cast about in search of an optimal framework for

¹⁶⁰ Feigenbaum, *China’s Techno-Warriors*

¹⁶¹ Zheng and Pan, 2013

¹⁶² James McGregor. “China’s Drive for ‘Indigenous Innovation’: A Web of Industrial Policies.” *US Chamber of Commerce*. 2010.

technological upgrading. In spite of this, results were largely mixed. While China's economy boomed, it largely failed to develop cutting edge firms or brands in core high tech industries. To wit, foreign MNCs largely monopolized China's export of high-tech products and services; fueling growing concerns within China that globalization was potentially compromising national security by opening up new sources of foreign dependency.

Although core components of techno-industrial policy remained firmly in place, they co-existed with substantial changes in China's technological ecosystem. In summarizing the trajectory of China's technological development in the 1990s, Tai Ming Cheung and others report that:

China embraced key elements of techno-globalist thinking in the early 1990s by opening up the national economy to FDI and rolling back state dominance of the S&T system by allowing the participation of private and other non-state firms. This led to massive inflows of foreign investment into the medium and high-technology sectors by multinationals, and soaring imports of technology goods by foreign and Chinese firms throughout the 1990s. In addition, large numbers of entrepreneurial domestic and foreign joint venture new technology enterprises were established or spun off from the state sector and quickly emerged as major players in the domestic technology marketplace.¹⁶³

While the China ceded sovereignty by embedding itself into global production networks, the state never bought into the normative principals undergirding liberal conceptions of globalization. The state retained significant scope for market intervention, walled off certain industries from foreign competition, actively promoted the buildup of a domestic S&T capability, and consistently held to a techno-nationalist worldview in which globalization represented an opportunity for China to harness the international economy as a way of gaining access to new forms of technology necessary for developing its economy and bolstering state

¹⁶³ Tai Ming Cheung, Thomas Mahnken, Deborah Seligsohn, Kevin Pollpeter, Eric Anderson and Fan Yang Tai. "Planning for Innovation: Understanding China's Plans for Technological, Energy, Industrial, and Defense Development." 2016. *University of California: IGCC*. < <https://www.uscc.gov/sites/default/files/Research/Planning%20for%20Innovation-Understanding%20China%27s%20Plans%20for%20Tech%20Energy%20Industrial%20and%20Defense%20Development072816.pdf> >

power and national security.

Decades after the conclusion of the Mao-era, the techno-nationalist legacy of China's strategic military planners continued to exert a strong pull on policy orientation. Writing again in *China's Techno-Warriors*, Feigenbaum states, "despite these dramatic changes, old ideas and behaviors persist. Indigenization remains the ultimate goal of economic integration with foreign partners; leaders in Beijing feign little interest in the liberal underpinnings of economic globalization"¹⁶⁴

4.4 Techno-Industrial Policy Under Hu and Xi

A shift in the orientation of China's overall techno-industrial policy approach became evident early on under the leadership of Hu Jintao and Wen Jiabao. According to Naughton and Ling, while technological development had long been a central priority of Chinese leadership, "the new policy orientation displayed a much greater willingness to directly shape specific industrial sectors through government intervention."¹⁶⁵

This sentiment is reinforced by the "Planning for Innovation" report on Chinese technological development, which argues that, "while the state has gradually retreated from the direct management of the Chinese economy in the post-Mao reform era, the S&T sector stands out as being subject to more state planning than ever in its history."¹⁶⁶ Naughton points out the extent to which government promotion of technology has displaced traditional industrial policy levers, stating, "industrial policy has increasingly been subsumed into technology policy" where "promotion of high-technology industry is arguably the central economic development policy of the Chinese government today."¹⁶⁷

Analyzing China's approach to innovation, Scott Kennedy writes, "China's leadership has identified creating

¹⁶⁴ Feigenbaum, 2003.

¹⁶⁵ Naughton and Ling, 2013

¹⁶⁶ Tai Ming Cheung etc.al. "Planning for Innovation."

¹⁶⁷ Naughton, *The Chinese Economy*, 2007. 366.

an innovation society as key to achieving sustainable growth over the coming decades and avoiding falling into the middle-income trap.” To do so it is “pursuing a techno-nationalist approach that supports domestic industry at the expense of foreign competitors.”¹⁶⁸ This analysis is also shared by Roselyn Hsueh in her book *China’s Regulatory State*. According to Hsueh, while the Chinese state broadly moved toward relinquishing economic control across the board, in sectors deemed to be of strategic significance (such as telecoms) there’s been a general trend toward re-regulation. Writes Hsueh:

By pursuing a strategy of economic-wide market liberalization and sector-specific reregulation, China has managed to obtain technological know-how, foster domestic champions, and retain an upper hand over foreign forces even in a more liberal environment. By liberalizing market entry and strategically utilizing FDI at the sectoral and subsectoral level, the Chinese government has modernized domestic infrastructure, maximized the domestic technology base, and promoted the competitiveness of domestic industry. At the same time, it has enhanced control of the most sensitive and strategic assets and restricted the business scope and market share of foreign companies in the most sensitive industrial sectors.¹⁶⁹

4.5 The MLP and SEI

One key moment denoting the re-emergence of a more explicit form of Chinese techno-industrial policy was the 2006 release of “the National Medium and Long Term Plan for the Development of Science and Technology” (MLP); a policy document broadly interpreted as codifying China's overall approach to future S&T development. The plan enshrined the primacy of “indigenous innovation,” setting out the end-goal of establishing China as a technology and innovation power.

¹⁶⁸ Scott Kennedy. “The Fat Tech Dragon: Benchmarking China’s Innovation Drive.” *CSIS*. August 2017.

¹⁶⁹ Roselyn Hsueh, *China’s Regulatory State*, 2011. 259.

The impetus for the composition of the MLP began several years earlier under the direction of President Hu and Premier Wen; involving thousands of personnel with expertise in the fields of science, engineering, economics, military security and academia. The plan harkened back to earlier periods of extensive central planning, taking several years to complete and revealing deep fissures within China's policy elite regarding the optimal strategy for technological development.¹⁷⁰ Some involved in the drafting process argued in favor of perpetuating the existing development model based around attracting FDI and facilitating technology transfer, with others preferring a more proactive approach to cultivating domestic S&T capability.

Much of the analysis of the underlying rationale for China's high-level strategic emphasis on "indigenous innovation" stresses the sense of frustration felt by high-level state officials over the extent of Chinese reliance on external sources of medium and high technology. While China enjoyed substantial rates of economic growth from the period of 1978-2008, it did not succeed in cultivating a national ecosystem conducive to technological innovation. Nor, for that matter, did it shed its dependency on externally-based sources of strategic technology. Naughton lays out the shortcomings of the Chinese technology model that emerged in the 1980s and 1990s:

Precisely because China's specialized in the least technologically demanding stages of production, these linkages initially had few implications for technological development. Even when China was exporting finished goods that embodied high-technology components – such as laptop computers – the actual spillovers into indigenous technological capabilities were minimal. The global production networks involved in these high-tech commodities were largely closed, and Chinese domestic producers did not participate much, if at all.¹⁷¹

Chinese techno-industrial policy underwent a significant evolution since at least 1999, where many

¹⁷⁰ Cheung etc. al. "Planning for Innovation."

¹⁷¹ Naughton, 2007. 368

ideologically rooted statist policies were discarded in favor of “enabling” policies better capable of aligning government and corporate actors around a common objective of promoting high-tech development. Under the leadership of Hu-Wen government, technological and scientific development became a core rationale for mobilizing public support for state economic policy. The Hu-Wen emphasis on “scientific development” placed a newfound emphasis on human capital development, the adoption of foreign trade and promotion strategies geared toward the end goal of promoting native high-tech production capability.

According to Arthur Kroeber, the “indigenous innovation” strategy adopted under Hu and Wen and primarily enshrined in the MLP laid out an array of policy tools for promoting domestic technology: subsidies for high-tech R&D; the creation of domestic technical standards; public procurement policies promoting the acquisition of domestic technology; and increasingly onerous technology transfer conditions on foreign MNCs operating in the China market.¹⁷²

In finished form, the MLP keyed in on 11 sectors and 8 fields of technology for prioritization. The plan called for an idealized goal of devoting 2.5% of overall GDP toward R&D by the year 2020 while simultaneously reducing the level of reliance on imported technology to substantially lower levels. Perhaps most notably, the MLP called for the roll-out of 16 “mega projects” geared toward absorbing and adapting foreign technology for the purpose of indigenization. Some of the targeted mega projects included: integrated circuits, basic chips, software products, next-generation broadband wireless technology, advanced machinery, aircraft, and nuclear reactors. Underscoring the importance of the mega projects, powerful bureaucracies and planning agencies were assigned direct responsibility for implementation, namely the National Development and Reform Commission (NDRC), the Ministry of Finance (MOF) and the Ministry of Science and Technology (MOST).

¹⁷² Kroeber, 2016

Language contained within the MLP reinforces an emphasis techno-nationalism as the underlying rationale for pursuing development through indigenous innovation. One passage of the MLP states “facts tell us that we cannot buy core technologies in key fields that affect the lifeblood of the national economy and national security.”¹⁷³ Another line in the report stresses the need for making imported technology subservient to broader policy goals, baldly stating that, “one should be clearly aware that the importation of technologies without emphasizing the assimilation, absorption and re-innovation is bound to weaken the nation’s indigenous research and development capacity.”¹⁷⁴ Evidence of the sea-change in China’s techno-industrial landscape was quickly pointed out by observers of China’s political economy. In summarizing the move toward the indigenous innovation” strategy, Hout and Ghemawat wrote in 2010 that:

Local-content requirements, mandatory joint ventures, forced technology transfers – these aren’t new elements in Asian development strategies. Japan, South Korea, and India, among others, have used them and were less tolerant of foreign investment than China has been. However, the Chinese government is remarkable in how aggressively it applies these policies, how many of its agencies are involved, how quickly and radically it changes the rules, how many unique technology and product standards it tries to impose, and how subtly its regulations violate the spirit, if not the letter, of multilateral agreements.¹⁷⁵

More positive analysis was found in the scholarship of Xielin Liu and Peng Cheng in an *East-West Center* report on China’s indigenous innovation strategy. Lin and Cheng argue that China’s 2006 embrace of indigenous innovation resulted in serious structural changes in China’s innovation practices, incorporating old aspects of the “national innovation system” (central planning, universities, SOEs, government research) with new players in the innovation process (regional government, private firms, foreign MNCs). They concluded that indigenous innovation strategy has been largely “constructive and efficient” in facilitating innovation and technological catch-up, whereby “China’s central government has used the leverage of the

¹⁷³ McGregor, “China’s Drive for ‘Indigenous Innovation.’”2010.

¹⁷⁴ *Ibid*

¹⁷⁵ Hout and Ghemawat, *HBR*

nation's exceptionally large domestic market and a dynamic movement in China's economic history to mobilize both domestic and global resources in support of its indigenous innovation strategy."¹⁷⁶

Building off the blueprint laid out in the MLP, the Strategic Emerging Industries (SEI) initiative emerged several years later in the immediate aftermath of the 2008 global financial crisis. The plan gained traction through a policy document released in 2010 through the State Council entitled "Decision on Accelerating the Development of Strategic Emerging Industries." The SEI specifically keyed in on seven "emerging" industries seen as integral to China's ongoing transition toward an economic growth model tied to innovation and rising productivity. The seven sectors included: high-end equipment, ICT, biotechnology, advanced materials, alternative energy, eco-tech, and new energy-powered vehicles. Major government bureaucracies tasked with the implementation of the SEI included the NDRC, MOFCOM, MOST, MOF, and MIIT, with the NDRC playing the leading role in coordination. In keeping with the PRCs tradition of extensive state planning, the SEI called for the seven targeted industries to comprise roughly 8% of overall Chinese GDP by 2015 and 15% by the year 2020.

However, the SEI demonstrated a more nuanced and inclusive understanding of S&T development than its MLP predecessor.¹⁷⁷ Evidence of this can be seen in the SEI's greater emphasis on promoting international collaboration, focus on encouraging competition/exports with foreign markets, reduced emphasis on security-centric language, narrower overall focus in terms of goals and objectives, and greater willingness to situate technological development into the framework of economic development and ecological considerations.

The MLP and SEI demonstrated a renewed (albeit revamped) commitment to using techno-industrial industrial policy levers in service of promoting technological development under the banner of indigenous innovation. Taken together, the two marquee initiatives heralded a substantial increase in budgetary

¹⁷⁶ Liu and Cheng. "Is China's Indigenous Innovation Strategy Compatible with Globalization?"

¹⁷⁷ Cheung. "Planning for Innovation."

resources allocated high-tech R&D, targeted policy support for specified “strategic” technologies, sectors, and individual firms, and the increasing usage of related policy instruments designed to promote indigenous firms and protect them from foreign competitors.

4.6 Made in China 2025

The newest centerpiece of Chinese techno-industrial policy - “Made in China (MIC) 2025” - was unveiled by the State Council in May 2015 after two years of development and coordination between the Chinese Academy of Engineering and the Ministry of Industry and Information Technology (MIIT). The plan, which enjoyed top-level political support from the onset of its formulation, identifies ten strategic sectors for prioritization: information technology, high-end robotics and machinery, aerospace, maritime equipment, advanced railway technology, energy-saving vehicles, electrical equipment, new materials, biomedicine, and agricultural machinery.

As Xinhua reported during the unveiling of MIC 2025 in May, 2015, China’s ongoing struggle with decreasing demand, coupled with heightened international competition and the need to embrace higher value-added manufacturing, drove development of MIC 2025.¹⁷⁸ By combining information technology with traditional industrial sectors, China hopes MIC 2025 harnesses the trend toward “smart” manufacturing. By incentivizing the application of new forms of information technology into the industrial production process, Chinese state planners hope indigenous firms move into high stages of the international production chain; better positioning themselves to compete with leading “advanced-economy” firms from Japan and Korea to Europe and North America.

Taken together, the priority sectors constitute a substantial portion of China’s overall manufacturing sector. Much of the analysis of the MIC 2025 initiative points out that it contains contradictory language suggesting

¹⁷⁸ “Made in China” plan unveiled to boost manufacturing. *Xinhua*. May, 2015. < http://news.xinhuanet.com/english/2015-05/19/c_134252230.htm>

both market-conforming and market-distorting approaches to achieving core development objectives. MIC is often depicted as building off the template outlined in Germany's "Industrie 4.0" plan.¹⁷⁹ Central bureaucracies tasked with developing and implementing the plan emphasize MIC's conformity with similar plans found in both developing and developed economies.

Along those lines, according to analysis from CSIS' Scott Kennedy, MIC's overarching goal is "comprehensively upgrading Chinese industry, making it more efficient and integrated so that it can occupy the highest parts of global production chains."¹⁸⁰ Kennedy points out that the MIC plan differs from prior initiatives like the MLP and SEI in several important respects: in terms of the level of policy coordination, in terms of utilizing a broader array of policy tools, and in generally relying more on market-forces than central planning. Unlike the SEI, MIC 2025 promotes a broader swath of industrial sectors and focuses on the entire production cycle as opposed to simply emphasizing novel-product innovation.¹⁸¹

The plan fits into the broader goal of establishing China as the world's leading manufacturing power by the year 2049. To that end, MIC 2025 focuses on nine central priorities; bolstering of manufacturing innovation; the integration of technology with industrial production; improving the visibility of Chinese technology brands; restricting the manufacturing sector; and building up the national industrial base. Adding to the nine tasks, MIC targets ten key industrial sectors including: new forms of ICT, automated robotics, aerospace, power generation, railway transportation and oceanic engineering among others. To achieve the goals outlined in the Made in China 2025, the plan calls for the utilization of both state and market forces, including efforts at strengthening intellectual property enforcement with government financial support for Chinese firms and the creation of numerous innovation centers geared toward improving the efficiency of industrial production systems.

In meeting outlined manufacturing targets, MIC 2025 directly utilizes and/or interacts with a number of

¹⁷⁹ *MERICS*, Made in China 2025.

¹⁸⁰ *Ibid*

¹⁸¹ Scott Kennedy. "Critical Questions: Made in China 2025." *CSIS*. June, 2015. < <https://www.csis.org/analysis/made-china-2025>>

financial, legal and regulatory instruments, notably: preferential financial support and subsidies for domestic companies, policy recommendations for Chinese banks to extend financial support in hopes of building up native Chinese brands, support for R&D via the usage of state-owned or state-directed funds, state encouragement of outbound FDI in designated sectors, SOE consolidation aimed at creating national champions in strategic industry, restrictive market access and licensing agreements for foreign multinationals, the creation of unique domestic technical standards, discriminatory public procurement policies, and, finally, the usage of laws and regulations pertaining to national and cyber security as a means of curtailing market access for foreign companies.¹⁸²

However, critics of MIC 2025 see considerable scope for discriminatory state interventionism. In analyzing MIC 2025, the *US Chamber of Commerce* - drawing upon language contained in the “Made in China 2025 Major Technical Roadmap (Green Book)” put together by the National Advisory Committee on Building a Manufacturing Power Strategy - found that MIC aims at three key objectives: localizing and indigenizing R&D capacity and controlling key sections of the overall global supply chain in priority sectors; reducing overall dependability on foreign technology; and capturing a growing portion of global market share for domestic Chinese technology producers. In accordance with other central planning documents preceding it, the *Green Book* sets out explicit domestic production targets for designated sectors.¹⁸³

Made in China 2025 makes clear its objective of replacing foreign technology with domestically produced alternatives, explicitly calling for increasing the domestic market share of “core technology components” up to 70% by the year 2025. One key line in the plan outlines the objective of the Made in China 2025 as “to control essential core technology, improve industrial supply chains and build independent development capacities in basic, strategic and comprehensive areas related to the national economy and industrial security.”¹⁸⁴ According to the *MERICCS* analysis, language regarding “indigenous innovation” and technological “self-sufficiency” appears throughout Made in China 2025.¹⁸⁵

¹⁸² *MERICCS*, “Made in China 2025.”

¹⁸³ “Made in China 2025: Global Ambitions Built on Local Protections.” *US Chamber of Commerce*. 2017.

¹⁸⁴ *MERICCS*, 2017

¹⁸⁵ *Ibid*

Registering its concerns regarding the overall thrust of the initiative, the *US Chamber* writes that, “MIC 2025 aims to leverage the power of the state to alter competitive dynamics in global markets in industries core to economic competitiveness,” elaborating that, “China’s industrial policies, Internet and data legal and regulatory frameworks, and inward foreign direct investment regime regrettably suggest limited support for globalization and competitive markets.”¹⁸⁶ Similarly, the *MERICs* report on Made in China 2025 states that “China’s leadership systemically intervenes in the domestic markets so as to benefit and facilitate the economic dominance of Chinese enterprises and to disadvantage foreign competitors.”¹⁸⁷

4.7 The 13th Five Year Plan (FYP) and “Innovation-Driven Development”

Economic rebalancing through innovation also comes across as a central theme in the 13th Five-Year Plan (FYP); a comprehensive outline of China’s economic development strategy developed in consultation with a broad array of stakeholders. Much like the MIC, the 13th FYP places emphasis on the use of information technology as a central conduit for future growth and development.

According to a recent report from *CSIS*, “the plan puts a heavy emphasis on streamlining manufacturing, promoting innovation, and encouraging the development of more advanced technologies” which, in totality would move China toward “becoming an innovation power, pushing the boundaries forth of the technological frontier and moving up the value-added chain in a wide range of sectors.”¹⁸⁸ In spite of this, the plan largely leaves comprehensive SOE reform untouched, rehabilitates the use of the term “indigenous innovation,” and, most importantly, ambitiously lays out nine general techno-industrial policy initiatives and roughly 75 priority technologies to support through the allocation of billions of dollars in state backed subsidies and research grants. The FYP explicitly calls for supporting key techno-industrial policy initiatives, including: MIC 2025, the SEI and informatization-related mega projects. As the *CSIS* report again notes,

¹⁸⁶ “Made in China 2025.” *US Chamber of Commerce*.

¹⁸⁷ *Ibid*

¹⁸⁸ Scott Kennedy and Christopher Johnson. “Perfecting China, Inc.” *CSIS*.

“the plan emphasizes the need to protect China’s economic, cyber, and national security. It is likely that the collective consequence of these efforts to strengthen political control and national security are not supportive of the strengthening of unbiased market institutions.”¹⁸⁹

Another prominent shift in emphasis in Chinese S&T strategy is the increasing usage of the “innovation-driven development” concept under Xi Jinping, manifested most prominently in the State Council’s “Opinion on Accelerating Implementation of the Innovation-Driven Development Strategy through Strengthening Institutional Reforms” released in 2015. The opinion focused on the removal of barriers and strengthening of incentive structures conducive to improving S&T innovation within China.

4.8 Military Modernization, National Security and Informatization

Perhaps the central arena in which China’s techno-nationalist predilections blend with integration into the international economy concerns defensive modernization. As Cheung points out, China’s national system of defensive innovation improved markedly from the 1990s onward.¹⁹⁰ This was, broadly speaking, brought about by improved alignment between three powerful constituencies essential for effective modernization: the military, the defense and scientific research community, and civilian regulators. In no small part, defensive modernization reflected a recognition that access to foreign knowledge and foreign technology was essential for jump starting domestic innovation in the defense sector.

Cheung notes that within the uppermost echelons of the PLA, techno-nationalist notions rooted in historical experiences tracing back to the collapse of the Qing Dynasty and the successful “Two bombs, One Satellite” drive under Mao continually shape and reinforce the imperative placed on technological autonomy.¹⁹¹ While defense related projects don’t figure prominently in the content of the MLP, Cheung argues that it “seeks to blur the classic distinction between civilian and military technologies and points out that S&T development

¹⁸⁹ *Ibid*

¹⁹⁰ Cheung, *Fortifying China*, 2009.

¹⁹¹ *Ibid*

should benefit both civilian and defense needs at the same time.” As Cheung writes:

The potential benefits from the establishment of an effective and capable dual-use economy are numerous and wide-ranging. A dual-use economy will produce an environment that is more encouraging and supportive of the kinds of innovation and leapfrogging activities that the Chinese authorities are actively seeking to promote. This includes marrying commercial entrepreneurship and risk taking with the support of substantial state resources and R&D capabilities. The results should be the development of technology and equipment that is cheaper, better, and faster.¹⁹²

Whereas earlier efforts at civil-military integration were ineffective and poorly coordinated, the current movement toward *Yujun Yumin* is both more nuanced and well-thought out in its policy approach and enjoys a robust level of elite level political support. As Cheung notes: “Finding ways to catch up and leapfrog has become a central tenet in this search for a new development model. This is because a key assumption framing this debate is that the new information paradigm offers a unique chance to leap ahead and significantly narrow the military technology gap with the world’s advanced military powers.”¹⁹³

The blurring of the security and civilian sectors – embodied by the movement toward a dual use economy – is most clearly reflected in the current emphasis placed on development through the informatization of the physical economy. According to a recent CCP journal article in *Qiushi*, prepared under the Cyberspace Administration of China (CAC), the deepening of civilian and military capabilities is one of the central objectives of China’s current push toward a informatization-based economy.¹⁹⁴

In July, 2016 the State Council issued guidance for the “National Informatization Development Strategy Outline” as a way of strutting development of the ICT sector in China going forward. National security and

¹⁹² *Ibid*

¹⁹³ *Ibid*

¹⁹⁴ Elsa Kania, Samm Sacks, Paul Triolo and Graham Webster. “China’s Strategic Thinking on Building Power in Cyberspace.” *New America*. September, 2017. < <https://www.newamerica.org/cybersecurity-initiative/blog/chinas-strategic-thinking-building-power-cyberspace/>>

indigenous innovation figure prominently into the plan with specific calls for reducing foreign reliance on “core” technologies. References are repeatedly made to the priority of achieving a “secure and controllable” network system, with language tying informational superiority to national competitiveness and military security.¹⁹⁵

Unsurprisingly given the centrality of ICT as a major driver of both development and national security, Chinese leadership takes a keen interest in overseeing development and regulation. The clearest indication of this is the formation of the Central Leading Small Group for Network Security and Informatization set up in 2014 under the chairmanship of President Xi. According to Congressional testimony provided by Chinese cybersecurity expert Samm Sacks, the formation and composition of the group is reflective of two key developments in China’s ICT policy approach: the desire for centralization in the policymaking and oversight/implementation process and the rising influence of hardline thinking as it pertains to the cyberspace. Sacks states that, “within the Chinese bureaucracy, proponents of greater data localization, import substitution, sovereignty in cyberspace, and encryption access are exerting increasing influence over the policy agenda.....direction is coming from the highest levels in the Chinese system under the direction of President Xi himself.”¹⁹⁶

Evidence of this thinking further reveals itself in the words of President Xi himself, who has asserted that, “national security no longer exists without information security”¹⁹⁷ and that China should push for “internet sovereignty” as a means of safeguarding both economic development and national security prerogatives. Such language, built upon in an assortment of recent policy documents, refutes the Western notion of a “borderless internet” largely independent on extensive national regulation. The goal of ICT development through economy-wide informatization brings security concerns intimately into the realm of technological

¹⁹⁵ “Preventing Deglobalization.” *US Chamber of Commerce*.

¹⁹⁶ Testimony of Samm Sacks to U.S.-China Economic and Security Review Commission. Hearing on Commercial Cyber Espionage and Barriers to Digital Trade in China. < <https://www.uscc.gov/Hearings/hearing-commercial-cyber-espionage-and-barriers-digital-trade-china-webcast>>

¹⁹⁷ As quoted in the “Preventing Deglobalization” report.

development. As the “Preparing for Innovation” report points out, the Snowden revelations exacerbated existing worries about dependence on foreign technology for the provision of core digital network infrastructure.¹⁹⁸ In response, Chinese authorities are ratcheting up demands for access to proprietary information from foreign providers as a precondition for market access. In this light, national security legislation is widely seen as playing a dual role: preserving state security *and* promoting domestic technology. According to the report, “authorities are drawing up sweeping national security, cybersecurity, and foreign investment laws and regulations that require national security reviews and only permit use of technology that is ‘secure and controllable.’”

Within this framework of national security and cyber sovereignty are myriad concerns that vague and broadly defined definitions of security are means of suppressing competition, extracting technical concessions and promoting domestic alternatives. As the *U.S. Chamber of Commerce* points out, the “legal and regulatory framework that sets forth security-related requirements to support development of indigenous technologies and exclude foreign technologies poses an obstacle for foreign companies operating in these industries.”¹⁹⁹ China’s policies for achieving developmental and security outcomes in the fast-evolving ICT sector are easing fears over “Chinese leadership’s ambition to use the country’s industrial policy apparatus to foster domestic ICT capabilities for security purposes, political control, and economic power” wherein “protectionist instincts underlie security-related policy and regulation.”²⁰⁰

¹⁹⁸ Cheung. “Planning for Innovation.”

¹⁹⁹ “Preventing Deglobalization”

²⁰⁰ *Ibid*

Chapter 5: Case Studies

The preceding analysis focused first on techno-nationalism at the level of ideation; ideas concerning the relationship between technology, security, sovereignty and national development. As covered in chapter four, these ideas correlate with national technology policy; underpinning a comprehensive techno-industrial policy structure considered by many analysts as reflecting “techno-nationalist” thinking.

Chapter five situates ideas and policy into the realm of implementation and interaction. This is done in the form of three relevant (albeit brief) case studies: semiconductors, robotics, and AI. While these three cases hardly serve as a comprehensive basis to reach any sweeping conclusions about the nature of Chinese techno-industrial policy, hopefully they can better our understanding regarding the manner in which techno-nationalism affects the behavior of both foreign and domestic technology stakeholders.

The three examples were chosen on the basis of several common characteristics:

Dual Use: All three cases are clear-cut examples of technologies with both civilian and military application. As such, they are all seen as integral to China’s ongoing military modernization drive.

Core Technologies: At present and into the future, the three case studies are seen – both within China and abroad – as leading high-tech sectors. China’s emergence as a major player in these fields will likely have a significant impact on firms (if not entire national economies) in East Asia, North America, and Western Europe.

State Prioritization: State planning documents suggest high levels of policy support for indigenous development in all three cases. Key government initiatives like MIC 2025 hinge on successful development of industrial robots, AI, and semiconductors.

External Alarm: On account of the aforementioned three characteristics, all three case studies engender a considerable level of external scrutiny – both among governmental officials and within the international media. Actions taken by the Chinese state in promoting these industries is often pointed to in foreign capitals as rationale for restricting Chinese outbound FDI and/or imposing future sanctions.

5.1 Integrated Circuits (IC)

ICs can be seen as the “fundamental building blocks of today’s high-tech knowledge economy,”²⁰¹ with a widespread array of applications in both the commercial and military spheres. Proficiency in the production of semiconductors is seen as a hallmark of a modern, technologically sophisticated economy: the leading East Asia industrializers (Japan, South Korea, Taiwan) successfully developed globally competitive IC firms.

China’s state-led initiatives at enhancing domestic competitiveness in the global integrated circuits (IC) market have drawn a considerable volume of international attention in recent years. According to testimony from Jimmy Goodrich, Vice President of the Semiconductor Industry Association, “Chinese leadership at the highest levels has made it a priority to develop and produce semiconductor technology” where “no other Chinese industrial development program for the information technology (IT) sector is supported with the financial resources and central government attention given to the IC industry plan.”²⁰²

State of the Market:

The production and assembly of ICT products is one of the key industries driving overall growth in the Chinese economy today, accounting for roughly one-third of overall exports. As Dan Breznitz and Michael Murphree put it, “in addition to being the largest and most globalized industry worldwide, the IT industry is

²⁰¹ Stephen Olson. “Keeping an eye on US-China semiconductor supremacy struggles.” *East Asia Forum*. February, 2017. <<http://www.eastasiaforum.org/2017/02/20/keeping-an-eye-on-us-china-semiconductor-supremacy-struggles/>>

²⁰²Testimony from Jimmy Goodrich to U.S. – China Security and Review Commission. Hearing on China’s 13th FYP. <https://www.uscc.gov/sites/default/files/Jimmy%20Goodrich_Written%20Testimony%20042716.pdf>

far and away the most developed and important high-technology industry in China... This means that, with regard to economic growth, *the IT industry is the Chinese high-technology industry.*²⁰³

China today represents the largest and fastest growing market for semiconductors worldwide, accounting for roughly half the overall market in 2014. As such, foreign MNCs are increasingly reliant on access to the PRC market as a source of revenue. In spite of this, the bulk of semiconductors consumed in China are later re-exported as component parts of finished electronics systems. As Dieter Ernst points out in a report for the *East-West Center*, this system of foreign chips powering electronic exports has effectively created a “closed-loop supply chain that Chinese firms are not part of.”²⁰⁴ In this context, China has not developed cutting edge proficiency in indigenous semiconductor production. Instead, according to research from Stephen Olson of the *Hinrich Foundation*, approximately 80% of semiconductors used in electronics production in China today rely on imported ICs.²⁰⁵

A report prepared for the Obama White House on the state of the global semiconductor industry lays out the scope of China’s current limitations, stating that: “China lacks a tier-one semiconductor equipment firm”; “manufacturing of advanced logic chips is significantly behind the state of the art in the United States, Taiwan, and elsewhere”; and, finally, that “China has many semiconductor foundry companies, but all are at least one-and-a-half generations behind the state of the art in volume production.”²⁰⁶

In spite of these limitations, notable progress is being made. Some highlights include:

- China’s IC design industry grew from roughly 200 million USD in 2001 to roughly 13.2 billion USD in 2013.

²⁰³ Dan Breznitz and Michael Murphree, *Run of the Red Queen*, 2011. 5-6.

²⁰⁴ Ernst, “From Catching Up to Forging Ahead: China's Policies for Semiconductors.” *East-West Center*. 2015.

²⁰⁵ Olson, *East Asia Forum*

²⁰⁶ “Ensuring Long-Term U.S. Leadership in Semiconductors.” *President’s Council of Advisors on Science and Technology*. January, 2017. < https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_ensuring_long-term_us_leadership_in_semiconductors.pdf>

- Whereas in 2009 only one Chinese company registered in the top 50 fabless, the number jumped to nine in 2014.
- There are over 400 Chinese fabless companies operating in the PRC today.²⁰⁷

While Chinese progress in IC design has been substantial, capabilities continually lag foreign competitors. Many IC designers are simply too small to invest in substantial R&D; preferring instead to concentrate on appealing to lower-end consumer electronics such as toys, TVs, and sound systems. The lack of a world-class indigenous innovation capacity in advanced ICs is widely perceived as *the* signal weakness of China's overall domestic semiconductor industry.²⁰⁸

Policy goals and tools:

A number of recent policy documents enshrine the importance placed by the Chinese state on the further development of an indigenous IC sector. In 2014, the State Council released the *Outline for Promoting the Development of the Nation's Integrated Circuit Policy*. Contained within the policy document is language stating as follows: "heavy reliance on importation of IC products makes it difficult to strongly support the formation of core competitiveness in national industries and the protection of information security."²⁰⁹ The IC guidelines lays out the goal of becoming the industry leader in all segments of the industry by the year 2030, therefore curtailing the need for external reliance on imported circuits.

According to the analysis of Ernst, China's leadership see the evolving international IC market as rife with strategic opportunities for rapid catch up. He keys in on four areas China hopes to take advantage of in building up domestic capabilities: mobile device demand within China; changes in the nature of IC foundries; the use of partnership, industrial consolidations and international M&A; and, finally, emerging opportunities to gain market share in "trailing-node" semiconductor technologies.²¹⁰

²⁰⁷ Ernst, *East-West Center*, 2015

²⁰⁸ *Ibid*

²⁰⁹ "Preventing Deglobalization"

²¹⁰ Ernst, 2015

To ensure implementation of state objectives in the industry, a leading small group (LSG) on IC development overseen by Vice Premier Ma Kai has been set up, working in close collaboration with senior officials in MIIT. While the LSG draws on a considerable range of expertise in industry and research, foreign stakeholders are not seen as well represented. Written testimony prepared for the U.S. – China Economic and Security Review Commission quotes Vice Premier Ma as stating, “our government places great importance...on promoting the program of replacing foreign technology with leading, secure, indigenous domestic products.”²¹¹

IC-specific policies are seen as complementary to the broader thrust of Chinese techno-industrial policy, with similar language seen in both the SEI and the 2006 MLP, as well as in the 12th and 13th FYP. In particular, China has, for over a decade, been investing in a number of “mega projects” to facilitate indigenous innovation in core technologies. To that end, the 2014 IC circular called for raising over 100 billion USD in public and private funds for use in sectoral upgrading with MIIT playing a leading role. It’s estimated that, as of 2016, the National IC Fund raised over 21 billion USD, primarily from government and SOE sector. National level funding is complemented with an estimated 26 billion USD in local government funding. Analysis suggests that “the national and local funds have supported overseas mergers and acquisitions (M&A) by domestic Chinese IC firms as a tool to rapidly gain access to key semiconductor technology and intellectual property.”²¹² Billions of dollars in state funding are also directed toward helping domestic IC firms expand operations and invest in R&D. The 2014 IC policy seeks to address pervasive weakness in the domestic sector by both reducing the funding gap in R&D and strengthening coordination among different segments of the value chain.

Targeted industrial policies focused on the IC sector are also seen as complementary to broader techno-industrial policy goals and bolstered by a number of more generalized innovation policies. According to a

²¹¹ Testimony of Jimmy Goodrich.

<https://www.uscc.gov/sites/default/files/Jimmy%20Goodrich_Written%20Testimony%20042716.pdf>

²¹²

report prepared for the Obama White House entitled “Ensuring Long-Term U.S. leadership in Semiconductors,” China also promotes indigenous IC technology via a range of overtly discriminatory mechanisms: directly and indirectly forcing domestic customers to purchase Chinese brand ICs via public procurement policy and national security regulations; compelling the transfer of technology from foreign producers hoping to gain access to the Chinese market; and by the theft of IC IPR through both outright covert action and overt “secure and controllable” inspections.²¹³

The government impetus for pushing IC development also corresponds with a growing fear over US intentions toward China’s push into core technology. According to Ernst’s report: “In the view of China’s leadership, the United States has now shifted to more aggressive industrial, innovation, and trade policies to retain its leadership in the semiconductor industry.”²¹⁴

Future Outlook:

China’s approach to the development of its IC sector mixes elements of top-down central planning with a more bottom-up approach taking advantage of market forces. The government continues to play a major role in shaping industry outcomes. At the same time, the array of voices shaping government processes has expanded and now better accommodates the voices of industry players and researchers.

While seeking to develop independent and leading-edge capability in all segments of the domestic IC value chain, Chinese state planners recognize the globalized nature of the industry and the centrality of firm competition. In this sense, while globalization and interdependence are seen as threatening, they also present an opportunity for rapid indigenous technological catch-up in IC development through the harnessing of external markets, technology and expertise. In spite of this newfound appreciation of bottom-up drivers, the balance between state management and market competition remains in a constant state of tension. The state

²¹³ “Ensuring Long-Term U.S. Leadership in Semiconductors.” *President’s Council of Advisors on Science and Technology*.

²¹⁴ Ernst, 2015

deploys available industrial policy levers and control over the vast PRC market (subsidies, procurement, technology transfers, state backed M&A etc.) in making globalization work for the benefit of its overarching focus on national strengthening and development embodied by the possession of a leading indigenous IC industry.

Going forward, several issues will likely challenge future development of domestic IC capacity: overcapacity exacerbated by extensive state and local subsidization of domestic IC producers; structural impediments toward innovation resulting from both a top-down centralized approach *and* the fragmented nature of China's innovation system; cybersecurity and excessive protectionism, particularly in response to mounting regime insecurity in the face of external and non-traditional security threats; and, finally, tension with key trading partners leading to restrictions on access to global markets and technology.²¹⁵

However, given the extensive reliance on foreign branded chip to power China's overall electronics export sector - coupled with the need to promote domestic upgrading through outbound M&A - it's unlikely China will suddenly drive out external IC providers, instead leveraging control over the domestic market and extensive state fiscal resources to gradually build up indigenous alternatives.

5.2 Industrial Robotics and Automation

The connection between China's development of a robotics industry and overall industrial modernization comes across clearly in a 2014 speech given by Xi Jinping on innovation-driven development:

Robots are dubbed “the pearls in the crown of the manufacturing industry.” A country's achievement in robotics research, development, manufacturing and application is an important yardstick with which to measure its level of scientific and technological innovation and high-end manufacturing. Major robot-producing companies and countries have stepped up their efforts to gain advantages in

²¹⁵ Ernst, 2015

terms of technology and markets.

I couldn't help but wondering: China will be the largest robot market in the world, yet can its technology and manufacturing capability sustain it through the competition? We should make better robots and seize bigger market shares.²¹⁶

To that end, the development of industrial robots can be seen as imperative to China's broader goal of becoming *the* world leader in industrial manufacturing. As the Mercator Institute puts it in a recent report on Made in China 2025, "political support and public focus on robotics are stronger than for any other manufacturing technology."²¹⁷

State of the Market:

According to the International Federation of Robotics (IFR), China currently possess the largest operational stock of industrial robots in the world. The overall market size for industrial robotic in China today is estimated at 30 billion USD with roughly 90,000 industrial robots installed between 2010 and 2015.

Growth in the Chinese market has been substantial: annual sales increased by 27 percent in 2016. The IFR estimates future growth of between 15 – 20 percent annually between 2017 and 2020. According to IFR President Joe Gemma, "there has never been such a dynamic rise in such a short period of time in any other market."²¹⁸

Domestic producers represent a growing minority of the overall market within the country. Chinese producers saw growth of approximately 120 percent through the sale of robots to the electronics industry in 2016. However, in spite of this significant growth, the majority of industrial robots are imported from

²¹⁶ Xi, *Governance of China*

²¹⁷ *MERICCS*, Made in China 2025.

²¹⁸ "Robots: China Breaks Historic Records in Automation." *IFR*. 2017. < <https://ifr.org/ifr-press-releases/news/robots-china-breaks-historic-records-in-automation> >

abroad. Increasingly, Chinese firms are turning overseas to bolster technical competence and develop greater international brand awareness. In 2017, Chinese home appliance maker Midea successfully won approval for a deal to buy out German robotics maker Kuka. The deal was widely interpreted both within China and internationally as signaling the emergence of China as a major player in the international robotics market.²¹⁹

Policy Goals and Tools:

A number of structural factors are seen as reinforcing China's emphasis on automation: the aging population and shrinking workforce, rising labor costs, and heightened foreign competition from low-skilled manufacturing in developing economies. China is attempting a fundamental restructuring of its economic model geared toward services and higher productivity. Robotic prowess forms an integral component of this transition.

Several key policy documents outline the importance of developing an indigenous robotics industry. For example, the *Robotics Industry Development Plan (2016-2020)* aspires for the production of roughly 100,000 domestically branded industrial robots by the year 2020. The "Made in China 2025 Technology Roadmap" similarly sets out a hard target for indigenous production: calling for 80% of the domestic market to be captured by domestic producers by the year 2025 and 50% by 2020.²²⁰ Accordingly, China seeks to enter the top ten nations for automation per capita by 2020.

At the national level, an Advanced Manufacturing Fund has been set up with roughly 20 billion CNY to be put partially in service of robotics development. The fund is overseen by the State Development and Investment Corporation with financial support from both the national government and the Industrial and Commercial Bank of China.

²¹⁹ Edward Tse. "Midea's Move for German Robot Maker Kuka may be a turning point for Chinese Manufacturing." *SCMP*. <<http://www.scmp.com/comment/insight-opinion/article/2006054/mideas-move-german-robot-maker-kuka-may-be-turning-point>>

²²⁰ *MERICs*, Made in China 2025

Perhaps most notable has been the extent in which national level targeting filters down to local and provincial level initiatives. As one example, Guangdong Province, a hub of Chinese high-tech manufacturing, is offering over 100 billion USD in subsidies to thousands of local companies including those involved in the production of industrial robots.²²¹ According to the MERICS report, “local governments have opened or are planning to open nearly 40 parks for the development of the robotics industry” wherein “MERICS identified concrete robotics subsidy pledges in 21 cities and 5 provinces for promoting industrial robotics at a total value of nearly 40 billion CNY.”²²² Local government targets for robotics production vastly exceed the projected size of the domestic market. According to a recent CNBC report, UBTECH, a Shenzhen-based robotics company signed an agreement in April with Kunming City guaranteeing the company fiscal support for the further development of robotics and AI.²²³

Going Forward: Opportunities and Challenges

Estimates regarding the future growth of the overall Chinese market, as well as the position of Chinese domestic producers, are quite bullish. Chinese firms are perceived as rapidly catching-up with foreign competitors in the lower end of the market like loading robots. It's widely believed Chinese domestics will, over time, develop significant competency in the production of six-axis robots, core components, and welding.

However, a number of challenges confront Chinese producers going forward. The principal industry concern is extensive state promotion leading to substantial production overcapacity. The disparity between the projected size of the domestic robotics market and local level production targets runs the risk of creating a massive supply glut with potentially dire ramifications for domestic firms operating in the market.²²⁴

Secondly, as Zi Yang of the Jamestown Foundation pointed out to CNBC, an array of structural constraints

²²¹ Andrew Zaleski. “China’s Blueprint to Crush the US Robotics Industry.” *CNBC*. September, 2017. <<https://www.cnbc.com/2017/09/06/chinas-blueprint-to-crush-the-us-robotics-industry.html>>

²²² *MERICS, Made in China 2025*

²²³ Andrew Zaleski, *CNBC*

²²⁴ *MERICS, Made in China 2025*

to domestic innovation will continually hamper progress in robotics. In this regard, subsidization, weak IPR rights, government interference may lead to a focus on “quantity over quality.”²²⁵ Given the existing technology gap between domestic and international producers, particularly in areas like robotic programming and higher end “smart” robots, it’s unlikely China will wall off its domestic market from MNCs. Similar to the IC sector, China will continually rely on overseas M&A and foreign partnerships as a means of overcoming structural constraints on domestic innovation in the robotics sector.

5.3 Artificial Intelligence (AI)

The potential ramifications for national AI development are significant and multi-faceted; AI is widely seen as one of the most transformative areas for technical progress of the 21st century. According to a report prepared for the *Harvard Belfer Center*, AI development holds the potential for fundamentally reshaping three critical areas: military superiority, informational superiority, and economic superiority.²²⁶ Put another way, AI holds the potential for fundamentally altering the existing international balance of military and economic power, as well as transforming how humans being communicate and access data.

Public interest in AI has spiked in recent years on account of “four key drivers” of rapid progress: significant improvements in computing performance; larger overall data sets conducive to machine learning; advances in overall machine learning techniques through the development of more sophisticated algorithms; and a substantial rise in private investment, particularly among leading technology companies.²²⁷ So far, most progress is occurring in the field of “narrow AI” with meaningful progress in “General AI” (AI more closely resembling a human brain) seen as still over a decade away. A report on the future of AI prepared for the White House in 2016 categorizes “Narrow AI” as AI “which addresses specific application areas such as

²²⁵ Zaleski, *CNBC*

²²⁶ Greg Allen and Taniel Chan. “Artificial Intelligence and National Security.” *Harvard Belfer Center*. July, 2017.

²²⁷ “Preparing for the Future of Artificial Intelligence.” *Executive Office of the President National Science and Technology Council*.

<https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf>

playing strategic games, language translation, self-driving vehicles, and image recognition.”²²⁸ At this juncture the ramifications of AI are still poorly understood although it’s widely assumed the long term application potential is virtually limitless with massive ramifications for human life.

In recent years, China has emerged as a world leader in AI research and investment. Today, it’s “AI ecosystem” is the second largest in the world behind only that of the USA. China ranks second in terms of AI funding, number of companies operating in AI, and in number of patents. China also recently overtook the US in the number of AI-related academic papers. According to a recent report from the McKinsey Global Institute, “China and the United States are currently the world leaders in AI development.”²²⁹

China benefits from several underlying characteristics seen as conducive to progress in AI development: vast amounts of available online data integral for machine learning; weak privacy laws; a robust digital ecosystem; and an array of powerful private sector tech giants investing heavily in AI development. Baidu, Alibaba, and Tencent (“BAT”) are seen as leaders in the field of AI research. Chinese internet search companies – by virtue of access to vast quantities of consumer data – are particularly well positioned to take advantage of the AI trend.²³⁰

Harnessing the development of AI is widely seen within China as central to enhancing overall economic productivity and alleviating the concerns of an aging population. There is also hope that – by gathering and analyzing vast quantities of data – China will be able to prove more effective in resolving social problems through improved quality of governance.

Policy Tools and Goals:

²²⁸ *Ibid*

²²⁹ Dominic Barton, Jonathan Woetzel, Jeongmin Seong, and Qinzhen Tian. “Artificial Intelligence: Implications for China.” *McKinsey Global Institute*. April, 2017.

²³⁰ “China may match or beat America in AI.” *The Economist*. July, 2017.

<<https://www.economist.com/news/business/21725018-its-deep-pool-data-may-let-it-lead-artificial-intelligence-china-may-match-or-beat-america>>

The imperative placed on taking a leading position in the development of AI comes across clearly in the recently released State Council Notice on “Next Generation Artificial Intelligence Development Plan”:

At present, China’s situation in national security and international competition is more complex, and [China] must, looking at the world, take the development of AI to the national strategic level with systemic layout, take the initiative in planning, firmly seize the strategic initiative in the new stage of international competition in AI development, to create new competitive advantage, opening up the development of new space, and effectively protecting national security.²³¹

Chinese state planners see AI as an integral future technology; one essential to military modernization and national security *but* also critical for the civilian imperative of building a prosperous society through harnessing the movement toward “informatization” and intelligent manufacturing. The State Council plan stresses that, over the next decade, AI represents “the main driving force for China’s industrial upgrading and economic transformation.”²³² The future of national competitiveness – in both the security and commercial arenas – is seen as highly contingent on AI.

To that end, the State Council report sets an ambitious set of objectives: calling for Chinese AI to be “in step with globally advanced levels” by the year 2020.²³³ The aspiration is to create a 150 billion USD AI industry by the year 2020. According to the *Wilson Center*, while precise figures on state support for AI research are hard to come by, several important funding schemes, mostly overseen by powerful S&T bureaucracies like MOST, MIIT and the MOF are in place to support development.

Furthermore, as analyst Elsa Kania points out, development in China seeks to leverage partnerships between the PLA and the private sector; drawing on an overall national strategy geared toward a tighter knit dual-use or civil-military fusion approach. This will, according to her, “involve the establishment and normalizing of

²³¹ China State Council, *Next Generation Artificial Intelligence Development Plan*, Translation by China Copyright & Media <<https://chinacopyrightandmedia.wordpress.com/2017/07/20/a-next-generation-artificial-intelligence-development-plan/>>

²³² *Ibid*

²³³ *Ibid*

mechanisms for communication and coordination among scientific research institutes, universities, enterprises, and military industry.”²³⁴

Future Outlook:

In comparison to other leading technology areas, the government approach in AI development is less top-down: SOEs are not major players in AI development, the central government emphasizes collaboration and support for private sector AI players and sustains funding for research through support for the university and S&T bureaucracies. Private sector players are proactively hunting for top-level AI talent and investing heavily in R&D. As an example, Baidu created a 200 million venture fund in September, 2016.²³⁵

Several concerns emerge regarding the future of AI development in China. In comparison to the United States, there is a less developed ecosystem for technology startups. Secondly, according to the MGI report, “China is lagging behind the United States in creating a data-friendly ecosystem with unified standards and cross-platform sharing.”²³⁶ Access to government data sets for private sector entrepreneurs is also comparatively limited.

Further, despite leading the world in quantity of overall AI-related research papers, the best AI talent is still predominantly located in North America. Meeting the talent shortage in the field will be an ongoing challenge. As China moves in an increasingly authoritarian direction, the environment for attracting/developing AI talent may not be on par with the West. Finally, a core driver of AI development – computing power – hinges on China’s access to cutting-edge hardware technology.

Going forward, the outlook for AI in China is quite bullish with some concerns of the development and retention of research talent and the nature of the holistic data ecosystem.

²³⁴ Elsa Kania. “China’s Quest for an AI Revolution in Warfare.” *The Strategy Bridge*. 2017. < <https://thestrategybridge.org/the-bridge/2017/6/8/-chinas-quest-for-an-ai-revolution-in-warfare>>

²³⁵ Yujia He. “How China is preparing for an AI-powered Future.” *Wilson Center*.

²³⁶ “Artificial Intelligence: Implications for China.” *McKinsey Global Institute*.

5.4 Conclusions

As the three case studies demonstrate, the Chinese state is deeply committed to using a combination of state levers in promoting indigenous capabilities in all three arenas and has set ambitious policy targets for the medium to long term future. Extensive subsidization – at both the national and subnational level – suggests ambitious goals are being complemented with generous fiscal support. While subsidies, tax breaks, and funding for R&D remain the primary tools through which Chinese state actors help build up indigenous capabilities, a number of discriminatory policy tools are also employed – constituting the types of non-tariff barriers likely to continue drawing the ire of foreign MNCs and governments. In this sense, sector-specific policies mutually reinforce the broader techno-industrial policy system.

The rationale for doing so touches on both developmental and security imperatives; success or failure in harnessing the ongoing revolution in ICT - encompassing AI, IC and robotics – is an utmost imperative from the standpoint of the upper echelons of the CCP. Military modernization, structural transformation of the economy, and the management of social stability all closely intersect with the vibrancy of the overall national innovation system and the country's technical prowess in key industries. The legacy of top-down planning, skepticism toward reliance on foreign technology, and substantial influence from national security bureaucracies and the PLA all comes across in understanding government policy in the three case studies.

However, what also comes across over the course of the case studies is a nuanced system of techno-industrial policy incorporating techno-nationalist end-goals (techno-sovereignty, techno-primacy) with techno-globalist means (harnessing an open form of economic globalization). Put differently: Chinese leaders aspire to develop leading edge independent capability in all three areas, seeing success or failure as a matter of regime survival. However, practicality, not a rigidly statist economic dogma, drives techno-industrial policy.

Nor is the China of today as overtly xenophobic, isolated, and security-obsessed as during the Cold War period. Rather, as its senior leadership makes clear, China seeks to benefit from the existing international economic order without fundamentally upending it. Techno-industrial policies evolve in response to new challenges and opportunities presented by different technologies, increasingly relying on market forces and support for private sector players in attaining techno-nationalist end-goals.

Furthermore, while the national government provides substantial volumes of funding and sets overall policy parameters, much of the policy direction is done at the local and provincial levels, making it harder to reach any generalized conclusions regarding patterns of state behavior in promoting indigenous technology. This national-subnational discrepancy is compounded by the fact that, at the national level, an increasingly diverse array of stake holders shape both the process of policy formation and policy implementation. The central government approach also shows significant variation by industry: as a clear example, ICs and AI are being approached differently; with the state promoting SOE “national champions” for IC production while leaning more heavily on private sector players like Baidu and Alibaba to drive AI. As such, making any definitive statements about “China’s policy” toward a complex and multifaceted industry like robotics or AI is inherently fraught.

While those caveats are critically important, top-down industrial policy planning in accordance with techno-nationalist thinking remains salient in all three case studies. To that end, China aspires to reduce foreign reliance as a matter of long term strategy while simultaneously acknowledging the necessity of interdependence as a stop-gap measure for developing indigenous capabilities through international competition and access to foreign technology, capital, and technical know-how. In areas like ICs and automation, Chinese upgrading remains, for the foreseeable future, contingent on high levels of exposure to globalized production, trade and R&D networks. While China is quickly catching up, it remains a laggard in core aspects of both robotics and IC production.

In this sense, Chinese policy conforms with the “new” development models outlined in the literature review

section: Endogenous Growth Theory, the New Economic Geography, and Strategic Trade Theory. Unlike liberal orthodoxy, the state is not seen as a brake on growth and innovation but rather as a critical protagonist in carrying out “big push” initiatives seen as enhancing national competitiveness through the development of key high-tech industries. Evidence in the case studies suggests China’s leadership wishes to use state power and market leverage as a means of harnessing the open international trade and investment system for its own ends.

While fears of unfair regulatory treatment and eventual displacement pervade foreign thinking about the landscape for MNCs operating in the Chinese domestic technology sector, there is strong reason to believe foreign MNCs will remain integral players on the mainland well into the future. The rationale for this argument boils down to one of practicality: with an array of structural factors inhibiting domestic innovation, Chinese firms continually rely heavily on foreign-branded core components. In the highly globalized IC and robotics sectors, international collaboration is widely seen as essential to both innovation and commercial success. By abruptly closing itself off to the outside world, China would inflict substantial harm on its own economic fortunes and technological potential. Maintaining some degree of openness is also critical for attracting overseas research talent to the Chinese mainland.

Therefore, while foreign MNCs operating in key industrial sectors will continually complain that their commercial objectives are being subordinated to broader political imperatives, they remain integral subordinates whose ongoing cooperation remains essential to China’s long term strategic development.

Furthermore, Chinese firms, limited by their own domestic constraints, see foreign acquisitions as essential to ensuring they can reach eventual parity with leading international firms. By driving foreign MNCs out of the Chinese market, China runs the risk of seeing its firms sanctioned and/or blocked from investing and selling into critically important foreign markets. Whereas in past decades, China “invited outside investors in,” to participate in building up China’s domestic economy, Chinese firms are becoming increasingly internationalized; relying on an open trading system to “go out” in pursuit of foreign technology, foreign

talent, foreign brand names, and global market share.²³⁷ The case studies all underscore the extent to which China remains a stakeholder in globalization while simultaneously using state power in adapting it toward Chinese characteristics.



²³⁷ Zheng and Pan, 2013.

Chapter 6: Conclusion

While techno-nationalist ideology remains deeply entrenched within the upper echelons of China's political elite, the manner in which it manifests itself in the form of policy has evolved considerably over time and in response to both new opportunities and challenges. As Yongnian Zheng and Rongfang Pan see it, "unlike traditional forms of techno-nationalism, China pays attention to international commitments, cooperation with foreign partners, and public-private partnerships."²³⁸ Chinese state behavior suggests an acute awareness of the short and medium-term benefits of interdependency. While the long term goal may be technological autonomy, it's unlikely China will quickly reverse decades of beneficial integration with systems of international trade and investment.

Since beginning the process of "reform and opening" many decades ago, Chinese leadership has consistently demonstrated a high level of pragmatism, flexibility and adaptation in its approach toward promoting technological development. China's experience demonstrates that while convergence with western norms regarding free-market capitalism remains unlikely, the manner in which China practices its unique form of state capitalism is neither static nor captive to rigidly statist ideology. Processes of enhanced market competition, bureaucratic learning, growing R&D capacity, and a selective/managed embrace of economic globalization are all integral factors in accounting for China's emergence as a major technology player. Despite concerns over external dependency and a belief in the inherently competitive nature of nation-states along both economic and security lines, Chinese leadership is well aware of the benefits accruing from international collaboration, capital movement, foreign trade, and technology transfer. Using the power of the state to harness these benefits forms an essential component of China's overall development story.

In many instances, the state happily discards inefficient practices, cultivates input from a growing array of stakeholders, and selectively embraces processes of marketization seen as necessary for facilitating domestic

²³⁸ Zheng and Pan, 2013

competition and innovation. Seeing China's technology landscape solely through the outdated prism of a statist/militant techno-nationalism blinds us to a vastly more nuanced reality. While techno-nationalist ideology plays an important role in guiding and informing the construction and implementation of public policy, powerful bottom-up actors - embodied through a diverse and expansive array of politically relevant stakeholders - co-exist with the dictates of top-down central planning.

Decades of robust interaction with the international economy has resulted in extensive "socialization" of China's policy making process which, in many areas, seeks engagement with international norms, laws, and regimes governing trade and investment.²³⁹ Many of the seminal planning documents and public speeches outlining techno-industrial strategies for independent innovation also contain language suggesting the ongoing need for international collaboration. In a somewhat contradictory manner, Chinese leadership seems to go to great lengths to outline *both* the need for technological independence *and* international cooperation/harmonization.

The case of China's development of strategic technology therefore conforms with the insights of Michael Mastanduno, David Lake, and G. John Ikenberry in their analysis of realist state behavior in the face of growing economic interdependency. Writing in 1989, they found the complex interdependence was presenting new challenges and imposing new constraints on state action. According to them, "the growing interaction of international and domestic politics complicates the task of state officials seeking to realize objectives in both realms...the realities of interdependence dictate that the ability of governments to pursue domestic economic policies is influenced and constrained by developments in the international economy."²⁴⁰

In the face of newfound challenges and opportunities, the Chinese state mobilizes resources in pursuit of technological advancement for reasons specific to the "national" (state) interest. While in many instances China honors international commitments and presents itself as a committed stakeholder in the existing

²³⁹ A comprehensive overview of this learning process can be found in Scott Kennedy's *Global Governance and China: The Dragon's Learning Curve*. 2017.

²⁴⁰ Michael Mastanduno, David Lake and G. John Ikenberry. "Toward a Realist Theory of State Action." *International Studies Quarterly*, 1989.

system of international economic order, the underlying motivation remains a state-centric realist one: using international interaction as a means to the end of national development and strength building. In this regard, Chinese behavior is broadly in keeping with its East Asian peers; it is a keen exponent of international trade and investment as a means for meeting decidedly national political objectives. When international obligation clashes with national imperatives, states pursue courses of action in keeping with their own domestic priorities. States, driven by realist motivations, take advantage of the international system for their own benefit. In China, much as throughout the region, the boundary between the “national” and the “international” remains highly salient in framing conceptions of economic activity.²⁴¹

Technology has long been at the forefront of this tension between the international and the domestic. State actors make choices on policy and strategy while taking into account a comprehensive “national interest” that differs from that of the private firm or the individual citizen. When technology intersects with matters of national security and national development, states will unsurprisingly take actions they see as furthering national objectives. Evidence of this can be seen in China; with its myriad restrictions and conditions on foreign MNCs operating in key sectors, coupled with an extensive history of substantial policy support for campaigns geared toward bolstering domestic innovation capacity. Evidence of this can be seen in Japan; where a deep-seated techno-nationalism drove policy makers in the direction of limiting their dependence on foreign technology.²⁴² Evidence of this can be seen in the United States; where Congress and the Executive branch impose restrictions (often to the consternation of domestic stakeholders) on the export of certain technologies and screen the inbound flow of FDI in sectors seen as critical to the “national” interest.²⁴³

In that light, regime pragmatism and adaptation shouldn’t obscure the consistently techno-nationalist thrust of Chinese strategic thinking. Security challenges brought about by rising great-power competition with the United States, the ongoing specter of regional instability, and the potentially de-stabilizing effects of globalization on China’s internal political stability, all reinforce a long-stated desire for sovereign control

²⁴¹ Fallows, *Looking at the Sun*, 1994.

²⁴² Derek Hall, “Japanese Spirit, Western Economics: The Continuing Salience of Economic Nationalism in Japan.” *Economic Nationalism in a Globalizing World*, 2005.

²⁴³ Simon, *Techno-Security in the Age of Globalization*, 1997.

over strategically important technology. With the lines between external/internal and traditional/non-traditional security challenges blurring on account of newfound technologies, techno-nationalist policies prioritizing state prerogatives are evolving, not dissipating.

In one regard, Chinese regime attitudes toward technology share many core assumptions with other states throughout East Asia; principally a focus on the role of developing national technology as a means of bolstering national competitiveness and security. This emphasis is deeply rooted in the history and culture of states throughout the region, where there is a strong tendency toward a “Listian” approach toward national economies, national production, and national technology. Throughout the region, the ideas and institutions synonymous with techno-nationalism have not faded away in the face of globalization; in this regard, China is not unique. However, given the nature of China’s authoritarian political structure and its position outside the US-led alliance system, Chinese strategic planners must incorporate a wider ranging of security concerns into questions of technological development than their peers in Seoul and Tokyo. China therefore blurs the lines between security, trade, and technology policies in fundamentally distinctive ways.

Roselyn Hsueh describes the blurring of the security and economic strategic value parameters as such: “Chinese leaders and policymakers’ assessment of strategic value also provides critical information about the goals and means of the Chinese state. The subjective understanding becomes salient because the boundaries between the economic and political dimensions of strategic value blur. State goals of technological advancement, infrastructure development, and competitive domestic sectors cannot be disconnected from the Chinese government’s concerns regarding internal political stability and external security.”²⁴⁴

Given developments over the past decade, there is little evidence suggesting this sentiment has meaningfully changed. Essential policy documents like MIC 2025 and the latest FYP underscore statements from senior officials within the Chinese government - most notably President Xi himself - signaling an intense fixation

²⁴⁴ Hsueh, *China’s Regulatory State*, 34.

on using state power to move up the technological value chain and, ultimately, reduce reliance on foreign technology in sectors deemed critical to growth and military security. In this sense, globalization presents not so much an attractive liberal approach to structuring the relations between state, society, and market, but rather an opportunity for achieving fundamentally realist end-goals of developing the national economy and enhancing national strength vis-a-vis rival state actors. China's leadership doesn't share certain core ideological convictions about the liberal positive-sum nature of globalization. Nor, as a rising superpower, will it likely remain happy with its status of place in the existing international order.²⁴⁵

How China relates to processes of globalization, and the policy tools it deploys in managing its effects, are therefore fundamentally unique. As Zheng and Pan describe it, “the Chinese state managed to leverage domestic and international resources for economic and political gains oriented towards autonomy and independence. This was achieved mainly through innovation of alternative institutions to harness economic liberalization and globalization.”²⁴⁶ Given the nature of its political system and the logic underlying its consistently realist approach to grand strategy, it's to be expected China will continually use the institutions of state in promoting indigenous innovation. The imperative placed on minimizing the extent of its external dependency on strategic technology for reasons of security, development and national prestige will not dissipate barring systemic change in its internal political structure. China will continue embracing aspects of techno-globalism and techno-pragmatism while retaining considerable scope for state action in accordance with core techno-nationalist tenets.

Given this state of affairs, foreign companies operating in China today face a dilemma best summarized by long-time China consultant James McGregor:

The indigenous innovation drive is forcing foreign technology companies to anguish over balancing today's profits with tomorrow's survival. With its extraordinary infrastructure plans and continent-

²⁴⁵ Mearsheimer, *Can China Rise Peacefully?*, 2014

²⁴⁶ Zheng and Pan, 100

sized consumer market that has just begun to really develop, China is a market no multinational can ignore. But the price of admission is getting more expensive by the day as China opens its policy toolbox to ensure that foreign technology allowed into China is accessible for “co-innovation” and “re-innovation” by Chinese companies.²⁴⁷

Studying China’s top-down technology strategy indicates that it is not engaging in a gradual process of conforming with Western norms regarding the relationship between state and market. Events over the past decade bear out that normative convergence was unlikely given the worldview and governing structure of Chinese elite-level politics. China’s emergence as an economic, technological and military superpower must be situated in a domestic political context of an increasingly insecure one-party regime increasingly of both the internal and external challenges to the perpetuation of its political monopoly.

As the *Harvard Business Review* points out, China and the US, by virtue of their substantially different approaches to economic rule-making, are “structurally prone to economic conflict.”²⁴⁸ Given the inherent difficulties in successfully managing any period of great power transition, coupled with rising levels of distrust between the two central protagonists, the scope for conflict over trade and technology is likely to grow for the foreseeable future.

In spite of this, foreign companies and governments possess important sources of leverage. As the case studies make clear, Chinese firms are reliant on overseas acquisitions and overseas markets to develop indigenous capacity. Government efforts at facilitating M&A activity in areas like robotics and ICs suggest an awareness of this ongoing need. China’s current stage of technological development – characterized as the “going out” stage – relies on the consent of foreign firms and foreign governments. Rising protectionism in key markets like Western Europe and North America runs the risk of severely impairing China’s longstanding ambitions to innovate via acquisition.

²⁴⁷ McGregor, “China’s Drive for ‘Indigenous Innovation.’”

²⁴⁸ Hout and Ghemawat, *HBR*

Furthermore, with a large swath of China's electronic export economy still dependent upon foreign sourced core components, moving against foreign MNCs too quickly would inflict grievous harm upon entire regional economies still oriented toward export-led growth models. In this regard MNCs are still essential partners. Companies capable of providing core technology products – areas where China still lacks a credible indigenous alternative – will continue to be accommodated in the Chinese market.

However, broadly speaking, the overall outlook for foreign companies operating in the mainland technology market is not a positive one. To that end, foreign governments have begun contemplating more aggressive measures for restricting Chinese FDI in strategic industries and imposing higher costs for “unfair” trading practices. The most prominent current example being the section 301 investigation currently being undertaken by the US Trade Representative's Office into Chinese technology transfer.²⁴⁹

It's worth keeping in mind that attempts at strong-arming China through the imposition of sanctions, export controls, tariffs and FDI restrictions will likely reinforce hardline voices in Beijing predisposed toward seeing Western actions through the prism of containing China's rise. As James McGregor astutely notes, there is a prevalent “containment complex” narrative within Chinese state media which exacerbates a sense of xenophobia and national resentment among the general population. Furthermore, as he points out: “The Cold War trade and investment embargo is also not a distant memory. Continued US and European technology and munitions export controls imposed after the 1989 Tiananmen tragedy underpin Beijing's containment mindsets even though US export controls only affect a fraction of technology exports.”²⁵⁰ Among senior political officials within China there is widespread belief that foreign governments actively support domestic technology providers in a manner not dissimilar from China's own practices.

In this regard, should the United States and its allies gravitate toward more firmly combating China's techno-

²⁴⁹ “USTR Announces Initiation of Section 301 Investigation of China.” *USTR*. <<https://ustr.gov/about-us/policy-offices/press-office/press-releases/2017/august/ustr-announces-initiation-section>>

²⁵⁰ McGregor, “China's Drive for ‘Indigenous Innovation.’”

nationalist practices through sanctioning and/or the adoption of reciprocal policy instruments, it would likely tip-off a cycle a geo-economic escalation rather than move China further in the direction of desired reforms. It's widely understood that China possesses considerable scope for retaliatory action against foreign MNCs operating in the Mainland market should Beijing confront mounting coercive pressure from foreign capitals.²⁵¹ This is worth keeping in mind as Washington (and others) contemplate new strategies for handling commercial tension in the bilateral relationship.

If China's technological ecosystem retains a mixture of both bottom-up market forces and top-down industrial policy levers, the logical question becomes whether or not such an approach will deliver on Beijing's long-stated aspirations for technological primacy and relative autonomy? On this question there remains a significant and heated debate.

In assessing China's innovation policies holistically, Scott Kennedy writes that while "the amount of funds China has dedicated to developing advanced technologies is staggering," at present "China's innovation drive is highly inefficient."²⁵² The disjuncture between national and subnational policymaking, rival interest groups and poorly matched incentives between key stakeholders are likely to continue, inhibiting the overall innovation agenda. For many western critics, the increasingly authoritarian political environment is seen as a major impediment to further domestic innovation potential.

However, according to Brandt and Thun, the massive overall size of the Chinese economy confers specific advantages on Chinese firms operating within the domestic economy, advantages which cannot be replicated in smaller markets.²⁵³ Chinese technology firms, by virtue of having access to a massive internal market, have thrived in recent years and seem well positioned for taking advantage of a number of emerging technologies – particularly AI. China's market size and increasing levels of technological and consumer sophistication also affords it more leeway in imposing strict conditionality on foreign technology providers

²⁵¹ "China Warns of Retaliation after Fresh US trade probe." *Channel News Asia*. November, 2017.

²⁵² Kennedy, "The Fat Tech Dragon." *CSIS*.

²⁵³ Loren Brandt and Eric Thun. "Competition and Upgrading in Chinese Industry." *State Capitalism, Institutional Adaptation, and the Chinese Miracle*. 2015

in accordance with state security and developmental priorities. Whereas strict conditionality in smaller markets would run the risk of driving away FIE's, China is simply too large to ignore. In this regard, China is less likely to bear the costs of protectionism and techno-nationalist policymaking than smaller economies.

On the other hand, the legacy of top-down central planning remains prevalent within China's national and provincial level bureaucracies. There remains a pronounced tendency among officials at both the central and local level to measure success in terms of quantifiable plan-based numerical targets in areas like R&D spending, patents and production volumes rather than focusing on improving the institutional ecosystem for innovation through entrepreneurship and competition.²⁵⁴

While broadly supportive of China's innovation trajectory, Dan Breznitz and Michael Murphree warn of the dangers inherent to industrial policies oriented toward indigenous novel-product innovation. They warn that by pro-actively encouraging indigenous novel product innovation, the state runs the risk of pushing domestic firms into adopting strategies and behaviors at odds with their core competencies, strong-arming and eventually driving away potential multinational collaborators, and, by extension, engendering a backlash from foreign trading partners through the aggressive pursuit of state-led indigenous innovation policies.²⁵⁵

However, Breznitz and Murphree also point out the conceptualizing China as a uniform economy is an inherently fraught exercise. In their view, the IT sector is not homogenous but rather composed of distinct regional "systems." As they put it, "the realities of China's growth trajectory, and the discrepancies between state objectives and industrial reality, suggest that an institutional-political-economic explanation is relevant for understanding China's idiosyncratic, but highly effective, industrial-innovation strategy."²⁵⁶

With that insight in mind, it's to be expected that different regional economies will adopt different policy

²⁵⁴ Insights in China's innovation potential can be found in "Why China Can't Innovate" by Regina Abrami, William Kirby and F. Warren McFarlan and also in "How China's Government Helps – and Hinders – Innovation" by Anil Gupta and Haiyan Wang. Both are available in the *Harvard Business Review*.

²⁵⁵ Breznitz and Murphree, *Run of the Red Queen*

²⁵⁶ *Ibid*

approaches and attain vastly different outcomes in terms of cultivating innovation-driven development. At the same time, overriding national security challenges and the tendency among subnational government actors to copy aspects of national level policymaking suggests strong potential for techno-nationalist approaches to filter down to the regional levels of the Chinese economy in varying capacities. Ultimately, the state's role in driving policy is likely to remain normatively different than in developed economies. The efficacy of state action will remain deeply contested, and, depending on an array of factors, policy will be in a constant state of evolution and adaptation.

Hopefully the preceding research helps the reader develop a richer understanding of the relationship between technology, security, sovereignty and development in the People's Republic. With that said, it's important to point out the range of limitations and shortcomings of this thesis.

For starters, the research is qualitative. As such, it has limited utility in making meaningful judgements regarding the efficacy of China's approach to technological development. Whether China will become a leading technology power remains a question of substantial debate with global ramifications. This thesis lacks the capacity for meaningfully answering that question and can, at best, render a few generic opinions about both China's potential and shortcomings.

Second, the author lacks access to Chinese language source material. The bulk of the material utilized in conducting this research was second-hand; no interviews were conducted and most of the analysis was drawn from a synthesis of English language sources. Truly gaining a better understanding of Chinese techno-nationalism requires aptitude with Chinese language source material *and* firsthand access to individuals at the highest levels of Chinese business, government, and academia. The limitations of time, language and location all imposed constraints on performing deeper research.

Finally, a large portion of this analysis focuses on ideation – analyzing the role of ideas about technology and their interplay with security, sovereignty and national development – and its impact on policy.

Examining and explaining policy outcomes on the basis of such underlying ideas is inherently fraught and subjective; while the author shares the dominant view that China behaves as a perpetually insecure realist overwhelming focused on ensuring the security of the party-state model, that line of analysis is contestable. There is, simply put, no quantitative way of demonstrating the saliency of techno-nationalism in China today; no country openly identifies as such and recent government policies and public statements emphasize *both* techno-nationalist and techno-globalist sentiments. The categorization provided in this thesis is therefore subjective and open to contestation.

Two areas stand out in particular for future research: the role of nationalism and political sloganeering in driving technology policy and, more importantly, developing a better understanding as to how ICT is dynamically reshaping China's approach to governance, development, and external security. The feedback loop between rapid technological change, development, security and new approaches to market governance still remains poorly understood among international observers. ICT – the catalyst for extremely rapid change and interdependency – is constantly throwing up new challenges to Chinese national security doctrine and blurring traditional delineations in the security sector. The nature of these challenges have strong implications for government technology policy and the conduct of China's international relations.

This aforementioned feedback loop represents one of the most complicated and consequential trends in the world today – with ramifications well beyond China. How ICT affects state perceptions of competitiveness, security and the cost-benefit of embracing globalization will likely determine the framework of any future system of international order.

In keeping with an engrained pattern of historical behavior, the present-day CCP continually sees itself as the only institutional vehicle capable of executing on a grand strategy geared around national rejuvenation. Flowing from this logic, threats to the survival of the party-state model are interpreted as threats to the survival of China as a modern nation-state. The role of technology has always closely intersected with these questions of existential importance. Within the CCP, there exists a deep seated belief in the efficacy of state

power in promoting the utilization of strategic technology in pursuit of core political objectives.

The conclusion of this research holds China will remain a major stakeholder in core aspects of the existing globalization system while interacting with it on its own terms; security concerns will understandably override domestic reciprocity in terms of market access for foreign MNCs. The key question is whether this lack of liberal convergence will prompt a techno-nationalist backlash in developed markets, inevitably leading to greater restrictions on the flow of capital, technology and technical knowhow across national boundaries. With Sino - American security competition on the rise and protectionist sentiments mounting across the developed world, Chinese private and SOEs sector firms may face sharper restrictions on both the acquisition and sale of technology products.²⁵⁷

The noxious mixture of trade concerns over Chinese practices in leading overseas markets, great power tension, and China's draconian and restrictive approach to ICT market access, runs the risk of creating a bifurcated global economy wherein China and the West develop incompatible and insulated ICT paradigms.²⁵⁸ Such an outcome, while certainly not inevitable, would have severe ramifications for the stability of the international security and economic order.

Regarding China's internal trajectory, many leading experts, perhaps most notably David Shambaugh, see China as reaching a "critical juncture" in which the sustainability of future economic and social development hinges on whether or not institutional reforms are successfully implemented. In Shambaugh's view, *regime adaptation*, is the key question facing China today. As he puts it, "either these regimes adapt and become more inclusive, hence increasing their chances of political survival as well as facilitating socio-economic transitions and providing enhanced public goods, *or* they fail to do so and ultimately die."²⁵⁹ With that in mind, what, if anything, does techno-nationalism portend for China own future political trajectory?

²⁵⁷ Keith Bradsher. "Trump's Trade Pick Could Put China in a Tough Spot." *New York Times*. January, 2017.

²⁵⁸ This possibility features prominently in the "Preventing Deglobalization" report

²⁵⁹ David Shambaugh, *China's Future*, 2016.

On the one hand, as documented throughout this thesis, China's approach to technology policy demonstrates a high level of adaptation and pragmatism. Signature policy initiatives unveiled under Presidents Hu and Xi indicate a much higher degree of policy inclusivity; suggesting an acute awareness regarding the benefits of market competition and collaboration with foreign multinationals. China's senior political leadership implicitly understands social and political stability largely rest on a foundation of successful economic rebalancing and that such a rebalancing requires China becoming a technology and innovation superpower.

Those inclined toward taking a relatively sanguine view regarding the CCP's capacity for adaptation and, by extension, its long term vitality, can therefore point to aspects of techno-industrial policy as evidence in support of this broader argument.²⁶⁰ Successive generations of Chinese leadership, recognizing the imperative of technology in facilitating development, aggressively and pragmatically utilizes both state resources and market forces in service of building up a modernized S&T ecosystem.

However, regime pragmatism represents only one side of the narrative. While the manner of state intervention evolved over time via processes of institutional learning and adaptation, this shouldn't obscure from the fact that the Chinese state is widely perceived as being substantively *more* involved in directing and shaping techno-industrial policy now than during earlier stages of reform and opening. Furthermore, much of the language used in justifying China's overall technology strategy remains couched in the logic of economic and military competition; language indicating a profound discomfort with the liberal premise that interdependency safeguards external security. On this point there has been remarkable consistency across successive generations of Chinese leadership: national strength and relative power, not trade, represents the surest promise of China's survival. National technology was, is, and likely always will be seen by the CCP as an instrument of survival in a world of competing nation-states.

Analysis of contemporary Chinese politics usually emanates from a similar starting point: that China is governed as a party-state system where the overarching objective of the ruling communist party remains the

²⁶⁰ Evidence of party adaptation is provided in Bruce Dickson, *The Dictator's Dilemma*, 2016.

survival of the existing governance model. If this study demonstrates anything, it is further proof positive of the core realist axiom: in a world riven by pervasive insecurity, the centrifugal effects of globalization, and the constant specter of both internal and external security challenges, political leaders tasked with governing the nation-state prioritize survival and security over all other imperatives. In some ways, China's approach to strategic technology is broadly in keeping with patterns of behavior seen throughout the region, if not further afield; in other ways, China exudes unique characteristics suggesting its approach to strategic technology going forward is likely to be quite distinctive.



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