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Innovation and Enterprise in the National Security State

Linda Weiss

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Hybrid State, Hybrid Capitalism, Great Power Turning Point

Americans today consume more goods manufactured overseas than ever before, and yet they are less likely to be employed in manufacturing than at any time in the last 100 years.... This has potentially significant implications for defense, because to protect, we must produce.

Regina Dugan, 2011

The rise of China does not necessarily imply slowdown or demise for the United States. But if they specialize in making things and we specialize in finance, they will eat our lunch.

Simon Johnson, 2009

Concluding chapters traditionally invite reflections on the larger implications of a work, both theoretical and practical. Before tackling that task, however, let me start by recalling the key substantive issue. My orienting question focused on the unusual capacity for transformative innovation that has underpinned America's postwar dominance in high technology. Why, in particular, has the United States, more than any other country on the planet, been the source of so much high-tech industry, and why after, but not before, World War II? And is this pattern likely to continue into the future?

I have set my story within the evolving geopolitical landscape in which perceived threats to U.S. leadership helped forge a bipartisan consensus over the NSS technology enterprise. In a domestic context marked by intense political competition—often expressed in antistatist terms—this broad consensus has endured for more than half a century. Furthermore, when the NSS enterprise has appeared to stray too far or too obviously into the commercial arena—namely in nonhybridized forms—that consensus has at times worn thin, most notably in the period since the Cold War's end. As we have seen in the case of the Republican pushback on the military's renewable energy strategy (and as happened more spectacularly in



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the case of sequestration, a calculated gamble that went awry), the technology enterprise of national security is not immune to the wrenching partisan conflict that increasingly rends American politics.¹

However, the core of the story involves the creation and activities of a central new player, the national security state. The main arguments and evidence I have advanced can be summarized as follows.

America's propensity for radical innovation is not a "stateless" story and free-market capitalism is not how the United States achieved high-technology leadership. Through an extensive array of public-private alliances and innovation hybrids, technology development programs and investment funds, the United States has created not a liberal, but a hybrid political economy—one that is shaped by a national security state deeply entwined with the commercial sector.

Pursuit of defense preparedness, driven by Cold War exigencies and threat perceptions, produced a national security state much broader and more encompassing than the "defense sector," responsible for mobilizing the nation's science and technology resources.

The technology activism of the national security state—though of inestimable benefit to the nation's industry and innovation—was not motivated by economic ambition (industry policy) but by the pressure to sustain American primacy through technological dominance.

Nevertheless, challenges to technology leadership deriving from international rivalry and domestic structural changes have had the effect of reorienting the public-private partnership toward closer integration of security and commerce in the American economy. This has significantly broadened the reach of the NSS beyond the military-industrial complex as traditionally understood.

By privileging commercial viability in its investment strategies, the NSS has not only extended its technological influence outside the security arena; it has also ventured into economic activities that are more typically associated with the private sector. But by channeling its activities into hybrid structures that merge public and private resources, the breadth and depth of NSS involvement acquire low visibility and high (in other words bipartisan) political appeal.

In drawing out the implications of these arguments, I touch on two areas of political science, the first concerned with varieties of capitalism (theories of comparative political economy), the second dealing with American political development (specifically, understanding the American state as an economic actor). I then take up the substantive question of whether the NSS innovation engine is still working to the benefit of the United States and draw out its implications for the recent debate on American power and U.S. decline.

Comparative Institutions and Varieties of Capitalism



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Thanks to an ample critical literature, there is no need to belabor the point that comparative institutional analyses have often overstated the degree of congruence across different spheres of the national political economy. In the varieties of capitalism literature, for example, state activism is incongruent with, and thus absent from, depictions of the typical liberal market economy. While drawing attention to institutional discrepancies, the most advanced critiques nonetheless refrain from drawing the banal (and unhelpful) conclusion that all political economies are therefore simply “mixed.” More profoundly, by deploying the concept of institutional compensation, VOC critics enjoin the analyst to focus on, rather than dismiss, those apparently incongruent institutions.² Specifically, one should consider the extent to which nonconforming institutions may instead offset certain deficiencies or shortcomings of the dominant institutional complex.

The NSS Innovation Enterprise as a Compensatory Institution

Applying this conceptual framework allows a different perspective on the national security state (qua technology enterprise). Neither anomaly nor parasite, the NSS can be seen as an institution that (inadvertently or otherwise) compensates for certain shortcomings (failures?) of the free market for capital, goods, and services. The NSS’s compensation mechanisms take the following forms.

First of all, *the freedom to take a long-range view of investment in innovation*: in contrast, the private sector, with a constant eye on the bottom line, is constrained by the pressures of realizing shareholder value that rewards short-term value-extraction over long-term productive investment.³

Second, *an appetite for risk that is fostered by the drive for technology leadership and military preparedness*: such a risk tolerance promotes transformative innovation by focusing resources on achieving a desired goal with strategic importance.

Third, *provision of patient capital* (risk-tolerant, medium- to long-term investment): this enables pursuit of innovation with delayed payoffs, thus compensating for the more risk-averse behavior of private capital markets. The NSS provides several sources of patient capital, from technology procurement contracts to venture capital funds. As we saw in chapter 3, beginning with the galvanizing event of Sputnik, the federal government has created a network of government venture capital funds which fill a significant gap in the investment infrastructure for high-risk innovation.

Fourth, *cultivation of relational contracting and longer-term supplier relationships in producing new equipment*: this compensates for the short-term focus of the spot market for goods and services. Essentially, NSS contracting for new equipment provides a counterbalance to the arms-length approach that Hall and Soskice see as the sine qua non of U.S. capitalism. As research on capital goods industries has found

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(chapter 8), compared with firms engaged in strictly commercial customer-supplier relations, companies participating in defense contracting operate in a more supportive environment for long-term investment and the diffusion of advanced technology. As a consequence, they invest more than their strictly commercial counterparts in long-term supplier relations and modern, productivity-enhancing technologies that are relevant to nonmilitary production.

Regarding this last finding, it is worth pausing to take note of how it qualifies the varieties of capitalism theory of the U.S. model of capitalism. Here we see yet another way in which the NSS appears to plug institutional gaps in the U.S. model—not only with regard to the market for patient capital, including early-stage venture funding, but also with regard to the market for intermediate goods. This stands in contrast to the typical transactional approach of U.S. companies to their subcontractors.⁴ This of course illustrates the principle of institutional compensation that was sorely missing from earlier analysis of comparative capitalism with its emphasis on uniformity and coherence.

Finally, *cultivation of networks that plug gaps in the innovation ecosystem*: as we have seen throughout this study, the NSS is populated by a large number of units that routinely connect industry, investors, research labs, and program managers in networking arrangements with broad commercial reach. In this respect, the CIA's In-Q-Tel is typical in cultivating a vast network of private venture capital firms, labs and research organizations, technology transfer offices, and NSS-funded program managers. In this and many other cases, the NSS provides a coordinated, “collaborative public space” for plugging network gaps, which is critical to bringing innovations to market (Breznitz 2005). In this respect too, the NSS can be seen to fill in certain institutional gaps in the workings of U.S. capitalism.

In sum, the NSS does not complement the institutions of a liberal market economy so much as it compensates for them. As an actor with long-time horizons, a high tolerance for risk, and extensive networking capabilities, the national security state offsets well-described features of U.S. markets. The unremarkable point, of course, is that all political economies are a blend rather than a homogenous mix of institutional arrangements. Yet it must also be said that this does not automatically make them hybrid political economies. The United States, I conclude, is a genuine hybrid in the strong sense of the term—both at the macro level, because of the extraordinary scale, scope, and integration of its government-driven NSS with the workings of the broader market economy, and at the micro level because of the way it has organized its active involvement in the delivery and commercialization of innovation. My study therefore provides further support for the critique of the varieties of capitalism framework and demonstrates conclusively that the characterization of the U.S. political economy as a liberal market economy needs



urgent revision.

The American State

My analysis of the NSS technology enterprise also joins a substantial body of work that throws fresh light on the American state. This literature, usually identified with “unconventional approaches” to American political development, has paid particular attention to how national political institutions have been substantially shaped by international events and processes, and not least to the centrality of the military to early state building.⁵ Its findings in different domains of public policy at different periods have challenged an influential conception of the American state that emphasizes weakness, fragmentation, and ineffectiveness.

Inasmuch as the present study of the largely neglected field of innovation and technology development overturns the idea of an American state removed from significant economic involvement and influence, it strengthens this challenge. It is of course ironic that just as these fresh understandings of American political development began to emerge in the post–Cold War era, the fascination with neoliberalism, deregulation, and privatization also reached its peak (Novak 2008, 756).

Centralization versus coordination. In contrast to many other countries in which one agency or a few entities control funding for science and technology, the United States divides responsibility among multiple, mission-oriented agencies. Fragmented authority, decentralized decision-making, and policy pluralism are of course well-known features of administrative power in the U.S. polity. A common argument against government’s economic involvement is that the American administrative structure is too fragmented and the political system too “pluralistic, disorderly, and open at so many places to influence from special interests that rational government decisions on technology or industry policy are next to impossible” (U.S. Congress, Office of Technology Assessment 1990, 72).⁶

These features of American political institutions evoke a certain “messiness,” a lack of coherence, that sits uneasily with presumptions about what it takes to pursue strategy or make an effective state. For whatever else that recipe entails, centralized policymaking is widely considered an essential ingredient of state capacity. But is centralization perhaps overrated? In the innovation arena one might well conclude the reverse: that the decentralized, pluralistic character of the national security state has been a source of strength, not weakness. By creating a good deal of slack in the mission-led environment of the NSS, dispersed authority has allowed different technology bets to be placed, diverse experiments to be tried,

multiple sources of patient capital to be accessed—and not least, complementary agency strengths to be harnessed in bringing innovations to maturity (famously, DARPA, NSF, and the internet). Here, a reminder from Roland of the significance of the National Research Council’s “landmark study” of U.S. computer development, *Funding a Revolution* (1999), is appropriate. As he puts it succinctly, the NRC study concluded that “computer technology advanced in the United States because it enjoyed multiple models and sources of government support.” DARPA, he emphasizes, was “just one of several federal agencies...that made a difference” by playing “more or less critical roles at various stages.” (Roland 2010, 10). If, as Nathan Rosenberg states, “technological innovation is so uncertain that it cannot be planned, then encouraging diversity is the best ‘planning’ we can do” (cited in Holbrook 1995, 161).

One might venture further that a certain level of policy and program heterogeneity, by generating a variety of technology options, works something like the trial and error of the market. John Alic and his fellow innovation specialists concur with this proposition, concluding that “Despite the heterogeneity in federal policies—or perhaps because of it, given the high levels of uncertainty that characterize innovation—government actions have been remarkably effective” (Alic et al. 2003, 15).

Pluralism yes, but within limits. While the absence of centralization has been widely noted, and often lamented, the role of coordination has perhaps been underplayed. In addition to smaller initiatives such as alternative energy, there is now a well-established pattern of interagency coordination in national priority areas that include information and communication technology, bioinformatics, renewable energy, and nanotechnology. We have seen how this flow of R&D investment runs all the way from basic research to technology development to commercialization of results, and covers a wide range of innovations from artificial intelligence and digital libraries to virtual reality and the next generation of the internet.⁷ Indeed, compared with its reputation for dispersed policymaking, the United States is a relatively impressive practitioner of interagency coordination, which includes formal and informal mechanisms, bottom-up and top-down approaches, and bilateral as well as multilateral initiatives.

Prior to the 1980s, interagency coordination would often be carried out in an informal, bottom-up fashion as program managers from different agencies came together to create a joint agenda such as the Federal Laboratory Consortium. Over time, as technology ambitions and spending needs have grown, the tendency has been for the budget and general directions to be set through federal offices like those of Management and Budget and Science and Technology Policy.⁸ Most notably, the major High Performance Computing and Communications program,⁹ now part of a larger multiagency IT initiative,¹⁰ as well as the National Nanotechnology Initiative, bear the characteristics of this top-down coordination process that originated in

informal interagency exchanges.¹¹ Indeed the NNI is one of the clearest examples of this process, having built on the initiatives of key NSS agencies, which had already begun their own coordinating efforts. In the words of the director of the National Nanotechnology Coordination Office, this “closely coordinated interagency, cross-sector collaboration” forms part of “a new model,” which aims “to accelerate innovation in areas of national priority.”¹²

In sum, NSS agencies and components have long used a variety of formal and informal mechanisms to coordinate their shared interests in a particular field of technological innovation. Whether to mitigate areas of duplication and overlap or to bring complementary strengths to bear on common problems, federal agencies collaborate over projects large and small. Fred Block and Matthew Keller’s take on the federal approach to innovation, captured in the phrase “let a hundred flowers bloom,” is only half the story (2010, 168). For the full picture, the take of Andy Grove, the highly regarded former CEO of Intel, on the company’s approach seems closer to the mark: “Let chaos reign, then rein in chaos.”¹³ Grove’s saying brings to mind President Eisenhower’s description of the new DoD structure for managing research, development, engineering, and acquisition as the “decentralization of operations, under flexible and effective direction and control from the center.”

A relationship of governed interdependence. I have argued that national security is the main motivator of transformative innovation in the U.S. economy and that the national security state is a vital actor in that enterprise. Clearly, the national security state needs the private sector and nonstate actors to carry out its projects, and because of the myriad ways it pursues its goals, neither state- nor society-centered frameworks make much sense. On one hand, the NSS innovation enterprise has been built to pursue public purpose and mission-oriented problem sets; on the other hand, it has also been increasingly required to satisfy private goals, by absorbing risk and appealing to commercial viability.

The perspective I have emphasized seeks to capture the key features of this two-way relationship in the concept of governed interdependence. In this framework, we see quite clearly that the national security state is not just standing at a distance, mediating between private actors; nor is it delegating its powers in some sort of corporatist set-up. On the contrary, the NSS is project-oriented, proactive, and performance-driven. In the disciplining of private-sector performance, imperfect though it is in practice, we glimpse a standard imposed through multiple mechanisms, from cost sharing to time-limited support, that is conditional on designated milestones achieved. The NSS is in all these respects, and more, deeply integrated with the private sector to achieve its goals. Through a relationship of governed interdependence, the NSS thus expands its commercial reach while giving the commercial sector a stake in implementing its projects.



This concept applies whether the partnership is controversial (NSA and Google) or classical (the Department of Energy's nuclear labs and the supercomputer industry).

Using this framework, my analysis does not invert the original narrative about American inventiveness (clever folks, energetic entrepreneurs, tons of initiative)—on the contrary, it embraces them. These are all necessary ingredients for a high-risk project to work. Many more could be added. But a list of ingredients produces a recipe, not an explanation. My explanation emphasizes the point that the critical actor in the transformative story is the NSS—but not for statist reasons. Statism tries to control initiative—bound it, monitor it, direct it; in a relationship of governed interdependence, by contrast, the state tries to motivate initiative—frame it, discipline it, reward it. As Margaret O'Mara has observed in her history of Silicon Valley, the “tactics of private-sector persuasion—not government mandate—are often the way the U.S. state gets things done” (2005, xi). In the pursuit of technology leadership for national security, this relationship has produced industrially significant consequences.

Conceptually, the notion of governed interdependence thus accords with what King and Lieberman depict as the emerging understanding of the state in which “American state building, strength, and institutional capacity form through links with society, not necessarily by virtue of autonomy from society.” (2009, 549). In the NSS technology enterprise, governed interdependence is a way of conceptualizing those links with society: a relationship that involves considerable collaboration, negotiation, and partnering with private actors for mutual benefit, but which is ultimately governed by NSS objectives that prioritize security, not commerce. Quite often this relationship goes beyond mere partnering to create the fusion with nonstate actors and institutions that I call hybridization.

Hybridization. As we have seen, there are several ways of organizing links with society for the technology enterprise. Some of these links entail straightforward partnerships with private actors, such as ASCI, SBIR, Sematech, and the nanotechnology and battery consortia, while others involve the privatization of formerly public functions, among them the post-World War II replacement of the military arsenal by private contracting with industry, engendering the so-called military-industrial complex. But there are many more partnerings that fit neither of these forms, and that have their own logic. Rather than “privatizing the public,” these innovation hybrids mostly do the reverse: they draw the state into economic pursuits that are conventionally viewed as the “business of business”—hence a hybrid state.

Hybridization is a preferred American way of organizing the state-society link. Above all, hybridization comes to the rescue in a context where a robust antistatist ethos prevails and when a task calls for a strong state presence in economic ventures. What we have seen in the case of numerous investment and



commercialization ventures is a state whose actions are neither mediated nor conducted at a distance, but closely integrated with innovation and investment decisions—and commercial outcomes. Hybridization is why I conclude, contra Aaron Friedberg, that American antistatism has not restricted the state’s economic activism but simply changed its form of engagement, and thus helped shape its innovation enterprise. As a result of its bipartisan appeal, hybridization compensates for the antistatist constraint by neutralizing or sidestepping institutional and, not least, political blockage. In that respect, the American state’s forays into the innovation arena accord with the findings from many other domains of public policy, thus indicating a distinctive American way of achieving public purpose.¹⁴

On a more general note, students of American history would want to remind us that the American state (both subnational and federal) has always engaged in the development of its economy, whether in providing infrastructure and transportation technology or in promoting agriculture.¹⁵ In these and other pre-twentieth-century nation-building activities, the state centered on Washington was no different from—and certainly no less capable than—many of its peers. The emphasis of this study, however, has been on the distinctiveness of the American experience. Where it has differed, going a good deal further and faster than anyone else, is in pioneering and leading a high-tech innovation economy, propelled by a national security imperative. Owing to America’s antistatist taboo, immensely fortified by Cold War rivalry with a command economy, the legitimacy of that project could only be assured if the security rationale remained paramount.

Old Shibboleths. Any discussion of the American state cannot avoid the phalanx of readymade phrases regularly launched at government efforts to shape economic outcomes. Spearheaded by terms like “picking winners” and “government failure,” the presumptive bias seems to be that state effectiveness in a given arena must be measured by freedom from error and absence of failure.

But a fear of failure would be fatal to any form of transformative innovation, whether embarked on for security or for commercial reasons. Indeed, acceptance of failure is the operating principle in a number of NSS ventures. Take DARPA, for example. Its approach emphasizes “a complete acceptance of failure” if the payoff of success is high enough. Alex Roland (2010, 10) estimates no more than a 15 percent success rate. This makes for a long list of failures. Yet, rightly or wrongly, DARPA is widely discussed, admired, and known best for its successes including the internet, the GPS, and stealth technology. The CIA’s venture capital fund operates on much the same principle. In-Q-Tel’s inaugural CEO, Gilman Louie, put it like this: “The best thing about In-Q-Tel, to me, is that it’s risky.... The CIA’s new venture may fall flat, but so what. Washington has been a zero-defect culture for too long. If we want a CIA that performs better, we’ll need to take more risks—and give our government freedom to fail.”¹⁶ Moving well beyond the national security



arena, we find a similar view being articulated by the president of Pixar Animation Studios and Walt Disney Animation Studios, Ed Catmull: “We need a more risk-tolerant environment.... I always wince when I hear politicians attack a government-funded R&D program that’s slow to produce results or has suffered a failure as a boondoggle. They’ll say, ‘We’re going to prevent that from happening again,’ when their reaction should be, ‘Oh, good, we were trying something new and we learned from the failure.’”¹⁷ It is precisely the freedom to fail that is deemed crucial to the pursuit of high-risk, high-return research and technology development. As the founder of one of the handful of large corporations that still engages in this kind of activity, put it: “If you want to succeed, raise your error rate.”¹⁸

What does this discussion mean for an understanding of the American state? Most generally, in concert with studies in American political development focused on other policy domains, it means that as an economic actor, the state is far more effective—or if you prefer your glass half-empty, is much less ineffective—than our presumptions about distributed power and fragmentation tend to allow. As the U.S. experience shows, to produce results in the economic innovation arena, a state need not have centralized powers, dispensing policies in a highly orchestrated effort from the top. A less centralized, bottom-up but agency-directed process could deliver better results. Three conclusions follow. First, the larger the territory and the more advanced the economy, the more a form of “coordinated pluralism” is advantageous (and conversely, the more centralization is harmful). Second, to the extent that the American state has the ability to access, establish, and tease out desired performance from nonstate actors, this comes not from statism, but from a relationship of governed interdependence. Third, if the state often uses private actors to do its business, it also does business while appearing as a private actor—hence, a hybridized state. This at least is how I have come to view the NSS role in advancing the technological frontier.

On an equally general, but slightly different note, state activism is quite possibly the least of the threats that face a struggling U.S. economy. If anything, it may well be the weakness of the state’s response that matters most as the United States enters more troubled waters in the coming decade.

Great Power Turning Point

Since I have spent the major part of this book building a case that links technology leadership and the capacity for transformative innovation to the quest for American primacy, there are two obvious questions that remain to be addressed. Is the NSS innovation engine still working for the United States? And if not, why not? Even if entirely satisfactory answers remain elusive at this stage, I will try to show why the issue is



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important to consider. Specifically, the status of the NSS innovation enterprise has a strong bearing on the future of American power that is often overlooked in discussions of so-called “U.S. decline.”

I have argued that, in the post-9/11 era, the NSS innovation engine no longer has the laser-like focus that the intensity of the Soviet threat and Japanese rivalry encouraged. Wavering political support for the U.S. transformative project has also been evident in the period of asymmetric threats, manifested not only in Congressional pressures for short-term payoffs from military S&T spending, but also most powerfully in Republican opposition to those energy initiatives from the military that clash with a preference for the incumbent energy producers. Most of all, the breadth and depth of polarization in the political arena is strikingly revealed in the extent to which not even the prospect of a weakened military could prevent sequestration. And if this new era of budgetary uncertainty is unlikely to sharpen the U.S. strategic focus, one might still ask why China has not yet metamorphosed into a rival that spurs innovation like the Soviet Union and Japan.¹⁹ The question deserves further consideration because, although it is still a good way from the technology frontier, China’s rising status as a manufacturing superpower may well provide that launching pad, especially if the Japanese experience offers any guide.

To be clear, the NSS still has the ability to deliver technology leadership, which after all is the currency of U.S. military power. But what of its ability to continue delivering broader commercial-economic benefit? If this is in jeopardy does this mean that U.S. technology leadership, qua military superiority, is also compromised? My sense is that something disquieting is indeed taking place which, if not arrested, will unravel the technology enterprise and, along with it, the strategic and commercial benefits it has delivered.

These questions lead on to further questions connecting the debates about financialization, the offshoring of U.S. production, and American preeminence. What happens if U.S. technology leadership fails to translate into domestic production for commercial benefit? How long can a great power sustain its military leadership while leaking domestic manufacturing capacity to overseas locations? These, I grant, are large questions without easy answers. But that does not make them any the less essential to consider.

Let me emphasize that even if the United States is militarily overstretched or challenged by rising new powers on the horizon, it is not a great power in decline. It is true that Washington’s international influence has waned, that its economic and strategic agenda has a diminished global impact. It is in that specific sense that one can speak of the “end of the American era.” As Stephen Walt lucidly argues, this means that the United States is likely to “remain the strongest global power but be unable to exercise the same influence it once enjoyed” (Walt 2011, 7). Despite the many circumlocutions that play with terms such as “polarity,” “primacy,” “dominance,” “preeminence,” and the like, the United States is not about to fall from its perch as

a great power. Who needs reminding that its military primacy is still uncontested or that its capacity for innovation and high-value economic output, however unevenly distributed in national income, has no peer? The question is: Can the United States remain, well into the future, *the preeminent power*? Its economic strength has undoubtedly taken a heavy beating as a result of the 2008 financial meltdown and the massive indebtedness, fiscal crisis, and unemployment thereby created. Many thinkers, both conservative and liberal, have linked the origins of this debacle to the “financialization” of the U.S. political economy, whereby a financial oligarchy—or plutocracy—has wreaked systemic and social havoc by tilting the policy space and all other playing fields in its favor.²⁰ Here I wish to focus on a trend that is closely related to financialization, namely offshore outsourcing.

To begin with, it is well to knock on the head any possible confusion of innovation capacity with competitiveness. Surely, one is inclined to ask, if U.S. industry has been so effective in helping to turn out new widgets, why then is it lagging, with a manufacturing base that is now running on empty and job creation at an-all time low? A nutshell response is that competitiveness depends on many different factors, not just technology—among them productivity, currency fluctuations, and corporate strategy. To complicate matters, recent data on comparative performance show that a country—notably Germany—can score high on competitiveness while lagging in innovation capacity and technology leadership.²¹ Conversely, some industries may lose competitiveness even if they are innovators because they lack the necessary “complementary assets,” such as the capacity to manufacture and market, that imitators may access (Teece 1986, 303). As if to confirm that point, a 1991 Carnegie Commission report observed that “Our strengths in technology and innovation have not prevented an erosion in market shares of U.S. companies in many industries. As new products mature, the advantage quickly shifts from the innovator to the efficient producer.”²²

This last statement goes to the heart of the matter—production (as distinct from innovation) also counts a great deal for competitiveness. This fact in turn reveals the primary reason for anticipating diminishing returns from the NSS innovation engine, both for the U.S. economy and for the NSS itself: that a pronounced disconnect between innovation and manufacturing has come about as a result of downsizing production at home and distributing it to offshore suppliers. This disconnect is largely a consequence of financialism, not militarism or the national security state. By financialism, I mean not just the preponderant power of the financial sector in the political economy, but also the broad institutionalization of its value set throughout the industrial system, encapsulated in the primacy of shareholder value and the preference for financial investments over productive assets. Let us turn to see how this bears on the technology leadership



issue.

The disconnect: Innovation without production. Most of the current challenges to the NSS technology enterprise are worrying rather than critical. But there is one challenge that bothers many close observers. It is the fact that NSS innovation now confronts a dramatically changed domestic environment, one in which the bulk of U.S. manufacturing is increasingly conducted in foreign locations. U.S. industry has for a long time prospered as a result of the transformative general-purpose innovations shepherded into existence by the NSS. Companies have taken those innovations and designed new products. The difference now is that they have those products increasingly manufactured abroad. We come then to the most important reason why the NSS technology enterprise is likely to produce diminishing benefits for the U.S. economy (and ultimately for the NSS itself)—namely, the divorce between innovation and production. As a recent study conducted by the National Research Council concludes, “it no longer follows that discoveries and inventions flowing from research conducted by America’s universities, corporations and national laboratories will naturally lead to products that are commercialized and industrialized on U.S. shores...the U.S. is finding it increasingly difficult to capture the economic value generated by its tremendous public and private investments in R&D” (National Research Council 2012, 2).

The problem, now widely recognized, is that innovation has become increasingly disconnected from its manufacturing base—and thus from the industry development, productive investment, and job creation that have formed an essential part of nation and economy building. Let us also include the tax revenue derived from that base that helps sustain the NSS technology enterprise. Taking advantage of globally integrated production chains is of course now *de rigueur* for companies in many parts of the world. However, U.S. companies seem to have gone further than most, arguably creating an extreme form of the process. For example, as well as leading the way to become the “largest offshoring procurer” (Aspray et al. 2006, 29), they have also increasingly pushed the “downsize and distribute” process to the limits so that all the bits of a project may now be executed outside the country, including the most knowledge-intensive parts of the value chain (Government Accountability Office 2006, 2). For this reason, offshoring is widely perceived as the enemy of productive vitality at home. Although the trend began earlier, it has accelerated since the 1980s.²³

As one indicator of this trend, the China-located Taiwanese computer and mobile phone manufacturer, Foxconn, which figures prominently in the U.S. supply chain, now employs more people in China than Apple, Dell, Microsoft, Cisco, Intel, and Hewlett-Packard combined employ in the United States.²⁴ Another indicator is the state of U.S. investment. Whether in new production, or in product and process innovation, U.S. business investment at home ranked lower than in every other advanced country, just ahead of Burma



at 135th position, according to CIA data.²⁵ This accords with William Lazonick's findings that the large U.S. corporations that make up the S&P 500, while making very substantial profits, are reinvesting only a tiny fraction, if any, preferring instead to pay out the overwhelming share of their net income (94 percent) in dividends (40 percent) or for share buybacks (54 percent). Lazonick calculates that from 1997 through 2008, a total of 437 companies in the S&P 500 "expended \$2.4 trillion on stock repurchases, an average of \$5.6 billion per company, and distributed a total of \$1.6 trillion in cash dividends, an average of \$3.8 billion per company" (Lazonick 2011, 6). This practice, known as "maximizing shareholder value," is integral to the operational logic of financialization—the shift "away from productive investment and into financial investments where quick and larger profits can be realized" (Milberg and Schöller 2008, 5). In a survey by the National Bureau of Economic Research of 401 senior financial executives, almost 90 percent believed "building credibility with [the] capital market" took priority, hence a good 80 percent reported that they would slash or forgo spending on research and development to meet their quarterly projections; they also deferred company investment in valuable long-term projects to meet earnings targets.²⁶ Needless to say, this preference for consumption of profits over their productive reinvestment would have startled Max Weber for its ruthless cutting of the link between the "Protestant ethic and the spirit of capitalism."

Why the disconnect? What is the source of the drive to abdicate production to foreign suppliers? A key part of the puzzle is that U.S. innovation now takes place in a highly financialized environment. Its "downsize and distribute" business model is one in which increasing a company's share price has become the supreme value for corporate management, so U.S. executives tend to base their investment decisions on increasing corporate earnings in order to boost the company's stock price. This explains why it is that almost all S&P 500 companies devote so much of their income to repurchase their own shares.²⁷ Both offshoring and share repurchasing are favored because they boost stock prices and thereby increase returns to shareholders and to the top executives themselves who benefit when cashing in their own stock.

The two trends, financialization (especially share repurchasing) and offshoring, have grown together in a self-reinforcing manner. Lazonick's analysis suggests a three-step process whereby manufacturing is downsized and distributed to suppliers abroad. It begins with mass layoffs at home. Second, the layoffs release extra funds for the company and these funds are then used to make massive stock repurchases.²⁸ As the company's stock price increases, shareholders gain in dividends, and top management gains an income boost from realizing its stock options. Finally, what was once produced onshore with U.S. plant, labor, and equipment is now moved to suppliers in cheaper or more flexible locations. Hewlett Packard's actions exemplify the process: in September 2008, the computer company announced that it would lay off almost



25,000 workers; it then announced another \$8 billion share buyback (adding to an \$8 billion buyback program started in the previous November). Its stock price went up. A few weeks later, in October, Hewlett Packard announced its intention to build a new computer plant in China.²⁹ Whatever the benefits that offshoring produces, companies are diverting the gains to the acquisition of financial assets—as evidenced in the combination of a falling U.S. investment rate and a rising share of company profits in national income—hence sustaining financialization (Milberg and Winkler 2009, 2, 13).

Ashton Carter observes a similar financializing impact at work on defense companies, which face the same short-term pressures to justify themselves to investors as commercial companies (Carter 2001, 10). Thus, even the large defense contractors have joined the offshoring and share repurchasing practices, often conducting production for DoD through their foreign subsidiaries. For a decade at least, according to a survey conducted by the Government Accountability Office, prime contractors have been relocating manufacturing abroad to avoid payroll taxes and related expenses at home.³⁰ William Bonvillian (2009, 73) adds the striking observation that the relocation of U.S. industry abroad is dissolving the long-standing “triangular innovation alliance” between industry, universities, and the defense sector.

Whether to reduce costs, to avoid labor regulations, to be closer to the global market, or to access supply chains, the decision to farm out production is a choice that has been aided by America’s public officials who have rewritten the rules to encourage the process.³¹ As the institutional embodiment of the financialization process, financialism cultivates that choice, driving it further in the United States than almost anywhere else. A writer for *Computerworld* who covers offshoring practices in the IT sector put it most starkly: “We have lost manufacturing because Wall Street has rewarded short term solutions, like outsourcing... The financial services industry, including banking and insurance, is already the most aggressive industry in the U.S. when it comes to offshore outsourcing.”³²

When the pressure to relocate production comes directly from U.S. companies themselves, rather than from an abstraction called “globalization,” we might see in this a pattern of “extreme offshoring” at work. Consider for example, the Congressionally mandated 2007 study, *Rising above the Gathering Storm*, which reported that “For several years, U.S. companies that outsource information-technology jobs have all but ordered their contractors to send some portion of the work overseas...” (National Research Council 2007c, 27). Equally telling of financialism’s grip on the American entrepreneur’s imagination is the description of venture capital’s “exit-to-China strategy” for the U.S. computer industry. Andy Grove offers an illuminating example of the individually rational but collectively suicidal strategy to drive production offshore: “Five years ago a friend joined a large VC firm as a partner. His responsibility was to make sure that all the



startups they funded had a ‘China strategy,’ meaning a plan to move what jobs they could to China. He was going around with an oil can, applying drops to the guillotine in case it was stuck.”³³

In short, there is no dearth of innovation startups in the United States, but many of these no longer make anything. With some exceptions, the key products and services of the all-important ICT sector, including the high-value, highly engineered components— are increasingly made offshore, usually by Japanese, Taiwanese, Korean or German companies. Apple’s iPhone, a leading exponent of the “distributed” or “modularized” manufacturing model, exemplifies the problem.³⁴ As Grove went on to argue, innovation will hardly matter in keeping America in the lead if its inventions do not result in U.S. production.

Why should this matter to U.S. preeminence? Why is manufacturing important? The general argument, made by many scholars over the years, is that research, development, design and manufacturing need to exist side by side, that manufacturing matters for preserving hard-to-rebuild capabilities, for sustaining an ecosystem of industries, for future innovation, and not least, for creating skilled jobs. The pioneering study by Cohen and Zysman (1987) advanced a compelling argument that “manufacturing matters” — for job creation, competitiveness, and not least for technological progress, and that (*pace* the myth of a “postindustrial” society) services could never fill the gap created by the exit of manufacturing. Indeed, these and other researchers at the Berkeley Roundtable on the International Economy had been pressing the case since the early 1980s. Motivated by the Japanese challenge, they argued that the U.S. lead in R&D would count for little if the nation lost the edge in production.

In addition to severe economic consequences, many voices express fear of national security casualties of this manufacturing migration, including trustworthiness and supply assurance for critical components, especially regarding the strategically important microelectronics sector. In a startling declaration, a recent Defense Science Board task force on high-performance microchip supply had this to say about the relocation of critical microelectronics manufacturing capabilities from the United States to countries with lower-cost capital and operating environments: “From a U.S. national security view, the potential effects of this restructuring are so perverse and far reaching and have such opportunities for mischief that, had the United States not significantly contributed to this migration, it would have been considered a major triumph of an adversary nation’s strategy to undermine U.S. military capabilities” (Defense Science Board 2005, 4).

As the epigraphs to this chapter reveal, there is a growing awareness that changes in the U.S. industrial base provide little basis for complacency. Redressing the disconnect that has been fostered by an extreme version of financialization would seem critical to recapturing the outputs of innovation on which so much



else depends.³⁵ As the National Research Council study *Rising to the Challenge* concludes, “America’s economic and national security future depends on our succeeding in this endeavor” (National Research Council 2012, 12).

When institutional strengths become fetters. Mounting such an endeavor will be challenging, for in order to be effective it will have to confront America’s most powerful nonmilitary institution, the financial world. In particular, reconnecting innovation to production would require remaking the rules that currently tilt all playing fields in finance’s favor—whether the game is derivatives trading or high-tech offshoring and share repurchasing, and whether the locale is Wall Street or California. It is not hard to appreciate that any such reconnecting effort would require a degree of federal reregulation and intervention that would likely bump up against America’s pervasive distaste for government.

These observations can be linked to a theory of why countries lose their preeminence, if not necessarily their great power status. Essentially, the argument is that all countries institutionalize the features that make them strong, but when circumstances change, those very institutional strengths can turn into fetters that hinder efforts at reform to meet new challenges. By preventing effective adjustment to new circumstances, today’s strengths become tomorrow’s weaknesses. Countries thus get trapped in the very conditions that led to their success.³⁶ It does not take too much effort to see how such a framework applies to the U.S. experience. In America’s case, the power and values of finance—politically, economically, and institutionally—have become all-encompassing. A politically powerful financial elite has neither interest nor stake in the fortunes of the nation’s domestic industrial base. The dominance of financial capitalism in national priorities has weakened not only the domestic economy but also Washington’s global ideological influence. Having once contributed to the United States’ great power status, financialism has become a fetter that now threatens its preeminence by aiding and abetting the dramatic loss of industry abroad and by standing in the way of a reversal of this trend. Although using different language and addressing different questions, the recent analyses of the U.S. experience mentioned earlier reach a similar conclusion.

We can add to this institutions as fetters analysis. Aaron Friedberg ingeniously argued that American antistatism helped win the Cold War. It was the ace up the institutional sleeve that prevented the “most stifling excesses of statism” and “made it easier for the United States to preserve its economic vitality and technological dynamism” compared with its “supremely statist rival” (Friedberg 2000, 4). But now that circumstances have altered and there is a need to reconnect breakthroughs with followthroughs, distaste for government action can easily turn from asset to liability.³⁷ As Friedberg himself acknowledges in a prescient statement, antistatism can become self-destructive if unchecked: “Institutions that are perpetually



deadlocked will be unable to generate workable solutions to the new problems and challenges that history inevitably presents” (Friedberg 2000, 351). Whether manifest as institutional or politico-ideological deadlock, antistatism now keeps company with financialism, making remedial action by government a challenging task of high order.

In closing, it would be fair to say that there are doubtless more desirable innovation models than one centered on national security. But telling the U.S. story of transformative innovation as it is, rather than as one might wish it to be, deserves to be understood as an important task in its own right. For one thing, it confirms the more general point advanced in several existing studies, namely that the state remains a vital actor in helping to shift the economy up the technology ladder—a principle that clearly applies to the world’s most advanced political economy, *pace* its foundational narrative.³⁸ In addition, the story makes clear that even the most avant-garde innovation does not consistently translate into broader benefits if the disconnect from production is taken to an extreme, as the U.S. experience demonstrates. As for broader lessons, it is also evident that the U.S. approach to that continual ladder-climbing process is highly specific to its great power status and therefore unlikely to work for (or appeal to) others. The NSS innovation engine would be difficult to adopt or emulate because it is highly embedded in a national security logic that stems from the quest for strategic superiority. No other state has instituted such an NSS-driven innovation enterprise and there are very few candidates for such a model.³⁹ Given its size and military ambition, China might be a candidate for building a more statist version in the not too distant future. But for those very statist reasons, it is unlikely to achieve the transformative heights of the U.S. experience.⁴⁰

Finally, a key policy question is whether cutting the umbilical cord that connects U.S. industry and enterprise to the NSS by drastically scaling back its contribution to the technology enterprise would increase commercial innovation payoffs. From the perspective offered in this book, cutting the cord would be akin to killing the goose that laid the golden egg. Like the goose, some parts of the NSS, have a tendency to overeat and put on weight; they can sometimes make a lot of noise, act extremely aggressively, and even lose their way; yet over time they have also produced some pretty fine eggs for U.S. consumption (and some would say, for all the world). Moreover, if the foregoing analysis is accepted, a dismantling or further weakening of the NSS technology enterprise will not by itself provide the economic boost anticipated by advocates of a “civilian” technology policy. Restoring economic strength would require a concerted effort to reconnect innovation with onshore production, and thus a dislodging of the preponderant power of financialism that is presently part of the problem and hampers a solution.

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See Congressional Budget Office, March 18, 2013, “Approaches for Scaling Back the Defense Department’s Budget Plans,” <http://www.cbo.gov/publication/43997>.

35. The Center for Strategic and International Studies calculates that under sequestration, annual DoD spending would drop 31 percent from its 2010 peak, compared with a 33 percent decline after Vietnam, a 36 percent drop after the end of the Cold War, and a 43 percent plunge after the Korean War. See Bennett, *Defense News*, “How Big Would DoD Budget be Under Sequestration? Historically Big, It Turns Out,” February 8, 2013, <http://blogs.defensenews.com/intercepts/2013/02/how-big-would-dod-budget-be-under-sequestration-pretty-big-it-turns-out/>.

9. Hybrid State, Hybrid Capitalism, Great Power Turning Point

1. The impact of partisan politics, for example, in the domain of grand strategy is examined by Trubowitz (2011).
2. See the discussion in chapter 1.
3. Notwithstanding a recent emphasis on shortened time frames for S&T projects, as Congress has called on DARPA and other agencies to meet more immediate “warfighting needs.”
4. In the United States, the norm for the half-century since World War II has been “adversarial relationships with suppliers”; this began to change in the 1990s, in some sectors like autos (Helper and Levine 1992, 561).
5. The work of Balogh (2009), King and Lieberman (2009), and Novak (2008), as well as that of several other authors, highlights strengths within the American state, as well as the state-building role of the armed forces.
6. The same source also recognizes that this view is not consistent with the fact that the two technology leaders (and generators of trade surpluses), aerospace and IT, have been the most heavily supported by the U.S. government.
7. On interagency coordination in these areas, see the National Research Council’s *Funding a Revolution* (1999, 149).
8. A fourteen-page Office of Science and Technology Policy/Office of Management and Budget memo outlines this top-down budgeting process. See OSTP/OMB, “FY2004 Interagency Research and Development Priorities,” May 30, 2002, <http://www.hsdl.org/?view&did=464736>.
9. The 1991 HPCC Act grew out of the Office of Science and Technology Policy’s 1989 interagency plan for high-performance computing that initially involved DoE, NASA, and NSF, with informal but influential input of the National Security Agency; though focused on highest-end computers and applications, its impacts have been very broad, as supercomputer advances migrated to the desktop (chapter 5).
10. Known as National Information Technology Research and Development (NITRD).
11. On the interagency character of key computing initiatives, see National Research Council (1999, 130–132).
12. Teague 2011.
13. This became the title of a paper that Grove co-authored with Robert Burgelman in a 2007 issue of the *Strategic Management Journal*.
14. See, for example, Novak’s suggestive essay on “The Myth of the Weak American State” (2008, 770), in which he emphasizes “interpenetration” and “convergence” of public and private authority in everyday policymaking.
15. See, for example, Ferleger and Lazonick (1993) on the government’s early involvement in developing and disseminating productive resources for U.S. agriculture.
16. Cited in Ignatius, “The CIA as Venture Capitalist,” *Washington Post*, September 29, 1999.
17. “Pleasing Wall Street is a Poor Excuse for Bad Decisions,” October 20, 2009, <http://blogs.hbr.org/hbr/restoring-american->

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[competitiveness/2009/10/outsourcing-in-and-of-itself.html](#).

18. The statement is widely attributed to Thomas Watson, founder of IBM, although the original context is unclear.

19. Is it because China's production networks are organized as much offshore as onshore, making its strides less visible (hence less threatening)? Or is it because Chinese firms seem far from mastering the design of semiconductor technology, which the Pentagon views as the litmus test of technology leadership? However real (and shortsighted) such perceptions may be, the issue deserves further inquiry.

20. A growing literature from a distinguished group of economists and political scientists examines the harmful role of America's financial plutocracy: see, for example, Simon Johnson, "China Rising, Rent-Seeking Version," *Baseline Scenario*, August 11, 2009, <http://baselinescenario.com/2009/08/11/china-rising-rent-seeking-version/>; also Kurth 2011, 16. The entire January/February 2011 issue of *American Interest* is devoted to the question of American plutocracy.

21. Recent evidence on comparative performance suggests a more tenuous connection between competitiveness and innovation capacity. See Ezell, "The Atlantic Century II: Benchmarking Asian, EU, and U.S. Innovation and Competitiveness," July 2011, <http://www.itif.org/publications/atlantic-century-ii-benchmarking-asian-eu-and-us-innovation-and-competitiveness>.

22. Carnegie Commission on Science, Technology and Government, *Technology and Economic Performance: Organizing the Executive Branch for a Stronger National Technology Base* (1991), 48, <http://www.ccstg.org/pdfs/EconomicPerformance0991.pdf>.

23. As a share of GDP, manufacturing output declined from 21.2 percent in 1979 to just 11.7 percent three decades later (Cordesman 2012, 55).

24. Andy Grove, "How America Can Create Jobs," *Business Week*, July 1, 2010, p. 4.

25. Based on 2008 estimates from the *CIA World Fact Book*. The Bureau of Economic Analysis estimates gross U.S. private domestic investment as a share of GDP (inflation-adjusted) as 12.3 percent in 1990 and 13.1 percent in 2010, well below Korea (about 30 percent), China (almost 50 percent)—and even much-embattled Japan (20 percent).

26. J. Graham, C. Harvey, and S. Rajgopal, "Value Destruction and Financial Reporting Decisions," September 6, 2006, <http://dx.doi.org/10.2139/ssrn.871215>.

27. For example, over the 2000–2007 period, leading nonfinancial corporations (including but not confined to Microsoft, Cisco, Hewlett-Packard, Dell, Texas Instruments, Intel, and Boeing) purchased financial assets and distributed dividend payments whose value often exceeded their net income by up to 60 percent (Milberg and Winkler 2009, 15, table 3).

28. The data on corporate buybacks tell a startling story (see Lazonick 2009).

29. For the buyback details, see <http://www.stocktradingtogo.com/2008/09/22/stock-buyback-plans-flood-wall-street/>.

30. See the Government Accountability Office's 2010 report based on its survey of defense contractors.

31. One such rule is the 1982 SEC Rule 10b-18 which gave companies a "safe harbor" against manipulation charges being filed "if each day's open-market repurchases were not greater than 25 percent of the stock's average daily trading volume and if the company refrained from doing buybacks at the beginning and end of the trading day"; the rule was simplified even further in 2003 (Lazonick 2011, 7).

32. Patrick Thibodeau, "Bailout Won't Keep Wall Street from Sending Jobs Offshore," September 26, 2008, http://www.computerworld.com/s/article/9115638/Bailout_won_t_keep_Wall_Street_from_sending_jobs_offshore.

33. Grove, "How America Can Create Jobs," *Business Week*, July 1, 2010, p. 4.

34. For a discussion of how the IT sector lends itself to modularity—slicing and dicing the product into component parts that

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can be outsourced to global production networks, see Sturgeon 1997.

35. Threats to the U.S. industrial base from manufacturing decline are well recognized within the defense environment. See, e.g., Watts and Harrison 2011; also O'Hanlon 2011, 10.

36. For the original argument applied to Britain's rise and fall as a great power, see Mann 1988, chap. 8. However, I am using it to explain why U.S. preeminence, not its great power status, may be at stake.

37. See O'Hanlon 2011 on the need to overcome antigovernment influences as a matter of politics, political choice, and coalition building for change.

38. The historical role of government in effecting industrial and technological transformation is examined in Reinert 2007, Breznitz 2007, and Wade 1990.

39. A possible exception (that proves the security rule) is the case of Israel. For interesting parallels that highlight the important role of the defense industry in Israel's science-based industry, see Breznitz 2005, 2007.

40. Ironically, where the adoption of renewable energy is concerned (and resulting new industries and exports), Chinese statism may prove less of a hindrance to a "green-growth strategy" than American plutocracy. See, e.g., Mathews and Tan 2013.

