

GLOBALIZATION OF NAVY SHIPBUILDING

A Key to Affordability for a New Maritime Strategy

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The Navy states that 313 ships are necessary to support U.S. national security requirements. To build this fleet, the service is requesting a significant increase in its shipbuilding budget. Both the Government Accountability Office and the Congressional Budget Office contend that the Navy request underestimates true shipbuilding costs. Worse yet, current budget pressures and historical budget trends leave even the lowest budget figure in jeopardy. How then can the Navy make its plan affordable? To meet shipbuilding requirements it must look beyond domestic industrial sources and fully exploit the comparative advantages of globalization.

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Globalization exploits the advantages of multiple countries through not only labor and technology but also “trade, finance, production, and even the rules of national economies and how they relate to each other.”¹ Its impact on manufactured goods is complex and widespread. Today the meaning of an American or Japanese label on a computer or automobile is problematic, in that over two dozen components come from more than half a dozen countries.² A “made in the United States” security requirement has become an arcane vestige of the industrial age. At best, it is a comfortable fantasy. At worst, it is a waste of national resources. In practice, in fact, it is already a fiction. One needs to look no farther than the HARM, Patriot, and Tomahawk missiles or the “Marine One”

presidential helicopter to realize that foreign sourcing is already well under way in military systems.

Can global production reduce the Navy's shipbuilding cost risk? This article examines such a strategy to rationalize the budgetary means with the shipbuilding goals of the U.S. Navy.³ The service needs to exploit the efficiencies of foreign shipyards to meet its force planning goals. Globalization should be embraced as an affordability measure within the new maritime strategy now being formulated.

THE 313-SHIP NAVY

The United States is a maritime nation. "More than 80 percent of the world's trade travels by water and forges a global maritime link."⁴ As a result, American economic prosperity is contingent upon the freedom of the seas, and U.S. Navy primacy is the only reliable guarantor of that freedom for the United States and the international community. To maintain that primacy, in February 2006 the Navy laid out the details of a new plan for a 313-ship navy.⁵ During congressional testimony the Chief of Naval Operations, Admiral Michael Mullen, stated:

The 2007 Annual Long Range Plan for Construction of Naval Vessels is an investment plan that is both executable and affordable based on balancing several factors: naval force operational capability, risk, and the ability of the shipbuilding industrial base to execute the plan. . . . Full funding and support for execution of this plan is crucial to transforming the Navy to a force tuned to the 21st Century and built upon the foundation of Sea Power 21 and FORCENet. . . . As part of the QDR [Quadrennial Defense Review] process, the Navy used a capability-based approach to calculate the size and composition of the future force. . . . The analysis concluded that a fleet of *about 313 ships is the force necessary* to meet all of the demands and to pace the most advanced technological challengers well into the future, with an acceptable level of risk.⁶

If we accept at face value the figure of 313 ships as representing the tools required to execute the Navy's portion of grand strategy—that is, to support national goals with acceptable risk in the envisioned security environment—what remains is to rationalize resource constraints. Unfortunately, while the Navy believes the plan is executable and affordable, the Government Accountability Office (GAO) sums up the reality of the situation: "The Navy plan requires more funds than may reasonably be expected."⁷

The Cost Risk of the 313-Ship Navy

In press reports even before Admiral Mullen's comments, the Navy announced that it would require an average of \$14.4 billion annually for new ship construction over the next thirty years.⁸ This represented a 37 percent increase over the 2000–2005 average of \$10.5 billion in annual new ship-construction funding.⁹

A 2006 GAO report questioned the accuracy of the Navy estimate. It analyzed the cost growth in the construction of four ships, each the “lead ship” of a new class, over the period from fiscal year (FY) 1996 to 2006. This analysis revealed an average increase of 27 percent over initial budget estimates.¹⁰ According to the report, the Navy plan scheduled nine new lead ships for construction between fiscal years 2006 and 2016.¹¹ The Congressional Budget Office (CBO) is even less confident than GAO in the Navy’s numbers. Because of significant cost growth in recent Navy shipbuilding programs, the CBO projects the actual requirement to be \$19.5 billion, a 35 percent increase over the Navy estimate—and a nearly 100 percent increase over recent budgets.¹² Add on a CBO estimate of support ships missing from the Navy plan, and the annual costs reach \$21.7 billion (see figure 1).

FIGURE 1
AVERAGE ANNUAL SHIPBUILDING COSTS
(BILLIONS OF CONSTANT FY 2007 DOLLARS PER YEAR)

	New Construction Only
Navy shipbuilding budget in recent years	10.5
Navy estimate of cost of 30-year plan	14.4
CBO estimate of cost of 30-year plan	19.5
CBO estimate of cost of 30-year plan plus additional ships needed to fully support all elements of 313-ship fleet consistently over the long run	21.7

Source: Adapted from O'Rourke, *Navy Force Structure and Shipbuilding Plans*, p. 17.

Funding Risk

Operations in Afghanistan and Iraq have increased the need to replenish and replace existing weapon systems. For this purpose the Department of Defense doubled its planned investments in ongoing major weapons programs over the Future Years Defense Plan for 2001 to 2006, from \$700 billion to \$1.4 trillion, and increased its annual procurement budget 33 percent, from \$75 billion in 2006 to \$100 billion in 2010.¹³ These increases will cover present weapon system procurement but little more. On top of this, the new Navy shipbuilding plan doubles required funding from \$8.7 billion in 2007 to \$17.2 billion in 2011 and maintains it at that level.¹⁴ Worse yet, the Navy plan, the Army’s Future Combat System, and the Air Force’s F-22A Raptor and Joint Strike Fighter programs will be competing for increased procurement funds simultaneously.¹⁵ In this environment can the Navy truly expect to receive 17 percent of the 2011 Defense procurement budget for new ship construction alone, when it receives around 10 percent today?¹⁶

Further, Navy and Defense Department requirements are not the only pressures on discretionary funding. Rising costs for health care, education, veterans

affairs, transportation, natural resources, and the environment all make rising claims on this same pot of money. The fiscal reality becomes even bleaker when three facts are considered. First, the administration took on the global war on terror and the wars in Afghanistan and Iraq while cutting taxes. Second, Defense Department funding is historically cyclical, and a downturn is now likely (see

FIGURE 2
NATIONAL DEFENSE BUDGET AUTHORITY, FY 1946–2011



Source: Steven Kosiak, *Historical and Projected Funding for Defense: Presentation of the FY 2007 Request in Tables and Charts* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 7 April 2006), p. 4.

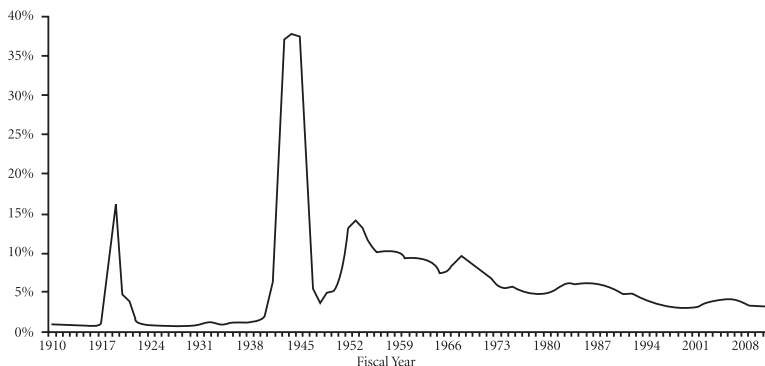
figure 2). Finally, Defense funding is shrinking as a percentage of gross domestic product (or GDP—see figure 3). In fact, the defense budget is to be cut from 3 percent of GDP in 2011 to 2.4 percent in 2024.¹⁷ Realistically, an increase in neither the Navy “top line” (total allocation) nor the Defense Department budget should be expected.

THE NAVY CONTINGENCY PLAN

Admiral Mullen acknowledges that funding for his plan must come out of the existing Navy budget top line.¹⁸ The Navy contingency plan therefore relies, according to the Center for Strategic and Budgetary Assessments, on the confluence of five factors: limiting increases in personnel costs, prioritizing shipbuilding budgets and construction rates, limiting increases in operations and maintenance (O&M) costs, reducing research-and-development (R&D) funding, and preventing upward “requirements creep” and cost growth in shipbuilding programs.¹⁹ Unfortunately, these factors are not completely within Navy control.

The first of these factors, personnel costs, currently accounts for 65 percent of the Navy budget. The service is reviewing personnel requirements with a view to reducing this figure. Military personnel needs were studied in FY 2006, while civilian personnel and contractor services personnel will be studied in fiscal 2007 and 2008, respectively. But the effectiveness of reducing personnel costs to hold or reduce the budget line may be limited by congressionally mandated raises in pay (i.e., military/civilian pay-parity actions in every year of the Bush administration except 2007) or end strength, as the Army experienced in 2006. The second factor, prioritizing shipbuilding, means lowering funding in other

FIGURE 3
NATIONAL DEFENSE OUTLAYS AS A SHARE OF GDP, FY 1910–2011



Source: Kosiak, *Historical and Projected Funding for Defense*, p. 12.

procurement accounts (aircraft, weapons, etc.). This is not practical, given the influence of aviation in a carrier-based Navy and the need for smart standoff weapons (cruise missiles, extended-range munitions, etc.) for the high-priority “strike” mission. Of what use is a carrier strike group without aircraft and weapons? Third, the Navy’s plan to

limit O&M costs is contingent upon keeping surface ships on line for their full thirty-five-year service-life expectancy; in fact, however, ships remain in service for significantly less time.²⁰

Fourth, reducing R&D costs is problematic. Arguably, the U.S. Navy’s fundamental advantage is in technology. It is not possible to build “upon the foundation of Sea Power 21 and FORCEnet” without innovative research and the developmental technologies it generates. Even if the Navy were in the future to use only commercial off the-shelf (COTS) technology, R&D funding would be required to ruggedize equipment for shipboard use and integrate it with existing systems. Further, Defense acquisition training stresses that the cost of fixing problems in a new system escalates by orders of magnitude as it matures from an idea through design to production and deployment. Thoroughness in the research and development phase is the key to avoiding these problems. How then will a reduction in Navy R&D funding limit cost growth in a ship’s construction or its logistical and maintenance support once in service? Experience shows just the opposite. The fifth and final factor, limiting upward pressure on requirements and therefore cost, may be a bridge too far, as evidenced by the GAO and CBO studies. Moreover, aside from mission, it is the rapid pace of technology that drives requirements creep.²¹ So if holding the line on requirements may limit cost growth, it will also diminish the technology advantage that ships take to sea.

Innovative thinking, then, will be required if the Navy is to build the 313-ship fleet. What keeps the Navy from building affordable warships?

DOMESTIC SHIPBUILDING

The commercial American shipbuilding industry is virtually nonexistent. What remains today is wholly dependent on a domestic market guaranteed by the Merchant Marine Act of 1920 (known as the Jones Act).²² Though once competitive in the world market, U.S. industry no longer exports any vessels.²³ Today, commercial vessels can be built in South Korea for a third of the price of comparable ships built in the United States.²⁴ In fact, a Korean shipyard can deliver a new ship for what an American shipyard pays for steel alone.²⁵

The American military shipbuilding industry is concentrated in six shipyards run by two prime contractors.²⁶ Their sole customer is the U.S. Navy. As the Navy shrank from the eight-hundred-ship fleet of World War II to the roughly 280-ship fleet of today, the shipbuilding industry consolidated. Unfortunately, however, while the Navy modernized, industry fell behind. Facing no competition, U.S. shipyards became inefficient and outdated. Today's U.S. Navy combatants are highly sophisticated and more lethal than ever, yet they are constructed in essentially the same manner as they were sixty years ago. Instead of reinventing processes to remain competitive as foreign shipyards did, U.S. yards relied on "Buy American" legislation. Analysis completed in 2005 showed that Navy and industry initiatives are closing the productivity gap with foreign shipyards;²⁷ nonetheless, American shipyards remain fifteen years behind foreign peers.²⁸

Industry blames low and unstable production rates for high material costs and low productivity. But those factors have existed for sixty years. Moreover, toward the end of the Cold War the Defense Department recognized that military demand would no longer generate the economies of scale required for affordable production. The present emphasis on dual-use technology, relaxation of former requirements to use military-specification components where industry specifications are sufficient, and the preference for COTS items wherever possible have all been outgrowths of that realization. Unfortunately, their effectiveness has been limited by the segregation of U.S. shipbuilding between the commercial and military sectors. Few shipyards work in both.²⁹

Commercial shipbuilding, then, depends solely on protectionist legislation, and military shipbuilding hides conveniently behind national-security claims. The Department of Commerce states this claim succinctly: "It is essential that the capability and infrastructure needed to build these [military] ships is resident in the United States because it provides added assurance that they can be built, repaired, and maintained during times of conflict."³⁰ The problem with maintaining such a "surge" capability is twofold. First, as the Commerce Department freely admits, maintaining excess industrial capacity drives up cost and degrades competitiveness. Between 1997 and 2002 the cost of a surface combatant rose 30 percent above inflation;³¹ in comparison, competition and overcapacity

in shipyards on the world market drove the price of a new commercial vessel down 19 percent.³² Second, the complexity of modern combatants renders a World War II–style mobilization entirely infeasible.³³ In fact, a three-to-five-year construction cycle means that a warship ordered at the beginning of a conflict is not likely to be available before the end.³⁴ Further, it is plainly unrealistic to believe that all foreign shipyards in friendly and allied countries “would simultaneously turn down revenues and deny access.”³⁵ Finally, as early as 1988 the national security strategy recognized that defense industrial mobilization is not a unilateral matter but requires coordination between the United States and its allies. In the words of President Ronald Reagan, “Fortress America is an obsolete concept.”³⁶

GLOBALIZATION OF PRODUCTION

Globalization is not new. Certainly the increasing rate of globalization since World War II is significant, but as Stephen Brooks contends in his book *Producing Security*, the real difference in the latter half of the twentieth century was the introduction of geographically distributed production.³⁷ In this “globalization of production” an item may cross international borders repeatedly in various stages of manufacture. Finished products can represent “work done in ten, twenty, or even thirty countries.”³⁸ Cheap transport and the free flow of capital allow companies to combine the advantages (e.g., in labor costs, technological prowess, heavy industry, banking, government subsidies, etc.) of any number of countries in a single product. Such cost-benefit analysis is continual: when the advantage shifts, so too does capital, always seeking the path of least resistance.

Unlike Sir Norman Angell in his famous book *The Great Illusion* (1912), Brooks does not guarantee peace or forecast the end of war. Instead, he concludes that the globalization of production is a new economic force for increasing international security. He adds it to the list of other great-power stabilizers, such as “democratic peace” (the presumed disinclination of democratic states to go to war), nuclear weapons, and international institutions.³⁹ He draws a second conclusion as well: “No state, including great powers, can now effectively remain on the cutting edge of military technology if it does not pursue significant internationalization in the production of weaponry.”⁴⁰ The opportunity cost of autarky is too high: it wastes resources replicating goods and services available competitively abroad; worse still, it denies these resources to the exploitation of domestic advantages.

Military shipbuilding requires a combination of heavy manufacturing and high-tech systems integration. Foreign shipyards have the heavy manufacturing advantage in building ships of low to medium complexity for the bulk transport and cruise industries. For its part, the United States designs and builds the most advanced warships in the world. The American shipbuilding advantage resides

in the area of complex combat systems that integrate shipboard, and increasingly offboard, weapons fire control, sensor, and navigational systems. Integration is the value added by U.S. industry.

Assume for the moment that U.S. Navy, federal, and state government funds were available to bridge the fifteen-year gap between American and foreign shipyards. There is no doubt the United States could eventually become competitive on the world market. But what is the opportunity cost of spending these resources to develop heavy manufacturing? Is internationally competitive shipbuilding the “value proposition” of the Navy after next? No. The Navy says the future resides in FORCEnet systems that integrate today’s platform-centric combat systems with tomorrow’s off-board manned and unmanned sensors and systems. That places the focus on developing and building these network-centric technologies. This is the indigenous technology necessary for national security, not heavy industry. Globalization of warship production would allow the United States to focus on its strengths today and tomorrow.

Globalization in U.S. Military Systems

Global production of military systems, like globalization itself, is nothing new. In fact it is a firmly established trend, even within the U.S. military. The presidential helicopter (actually a squadron of them), known as “Marine One,” is a case in point. Presidents have been flying in Sikorsky helicopters since 1957.⁴¹ Sikorsky is a U.S. company and a subsidiary of United Technologies, another American company. Yet today’s Sikorsky Marine One variant of Sea King aircraft, the VH-3D, contains a cockpit made in Taiwan, a fuel system and landing gear made in Brazil, a tail fin and stabilizer made in the People’s Republic of China, and a main cabin made in Japan.⁴² The VH-71, which will become the Marine One aircraft in 2009, will be a foreign design built by Lockheed Martin fronting for Agusta Westland, a joint British and Italian firm.⁴³ Is the Marine One of today or tomorrow truly “made in the United States”?

In 1992 the Commerce Department studied subcontracting in three Navy weapons systems: the Mark 48 Advanced Capability (ADCAP) Torpedo, the AGM-88 High-Speed Anti-Radiation (HARM) Missile, and the VLF Digital Information Network (VERDIN) communications system. It found that 13 percent of subcontracting went to foreign firms.⁴⁴ A 2006 Defense study found that 2 percent of all weapons system procurement went to foreign prime contractors. In fact, a detailed analysis of twelve weapons systems, including the Patriot Advanced Capability (PAC3) Missile, the Predator unmanned aerial vehicle, and the Tactical Tomahawk Missile, indicated that 10 percent of subcontracts went to foreign vendors.⁴⁵ In contrast, only 4 percent of the material purchased by military shipbuilders is of foreign origin.⁴⁶

A Quick Calculation: Global Warship Production

Global warship production would allow the Navy to combine the advantages of heavy manufacturing in foreign shipyards and systems integration in the U.S. defense industry.⁴⁷ Assume that the cost of a domestically manufactured warship without its combat system is \$200 million. Since, as evidence suggests, high-tech combat systems account for roughly one-third the total cost of a ship, completing the vessel adds \$100 million, for a total of \$300 million.⁴⁸ But a South Korean yard could build the same ship, less its combat system, for \$67 million. Add back in the U.S.-built combat system, and the total outlay is \$167 million—the globally manufactured warship is just over half as expensive as the domestically produced vessel. Granted, this is an oversimplified comparison; for instance, the additional outfitting costs of integrating the hull with the combat system would be substantial. Yet there is plenty of room to pay for outfitting at a domestic shipyard, as well as for “unknowns” like requirements growth, and still save money.

A THOUSAND-SHIPYARD NAVY

Like all new initiatives, global production of warships is not without risk. First, ownership of resources means that shipyards are available when needed; reliance on foreign yards weakens this guaranteed availability. Whatever the financial incentives of foreign industry to deliver, politics creates a whole different calculus for foreign governments. But this risk can be “bought down,” by spreading it across multiple international partners—a “thousand-shipyard Navy.” The vision is illuminating. It connotes a network of international partners, information sharing, and interoperability like that underlying the “thousand-ship Navy.” Friends, allies, and partners find ways of working together. A recent case involving the delivery of a German-built MEKO-type frigate to Australia illustrates this flexibility: the German government refused to send the vessel directly to the Persian Gulf, because of policy disputes over Iraq, but it was more than willing to allow delivery in Australia itself.⁴⁹

Domestic resistance can easily be envisioned as well. Congress, industry, and unions are certainly stakeholders and must be included in the strategy development process. Objections to foreign sourcing are well known. They revolve around loss of jobs, industrial facilities, and, consequently, political clout.

Certainly the risk of losing U.S. jobs is significant. The aircraft and automobile industries are examples by which to gauge the potential impact. Yes, jobs were lost, and industry was threatened as foreign sources were introduced. To mitigate the risk to domestic shipbuilding, then, start small with a single new class. Use Northrop Grumman or General Dynamics, owners of the six major domestic naval shipyards, as the system integrator and final outfitter (or divide

the two functions between them). As success builds, more classes can follow; if the strategy falters, it can be modified or scrapped while domestic capacity remains. In the aircraft and automobile industries, international competition greatly increased the productivity of American workers and increased pay commensurately. Both industries survived and rewarded customers with better products. Similar results are reasonable to expect in the shipbuilding industry.

Political objections need to be addressed with Congress, in advance and then continuously thereafter. “Buy American” restrictions increased sharply in the 1980s, but waivers and exceptions are available to circumvent them.⁵⁰ In addition, recent defeats of new restrictions are evidence that these hurdles can be surmounted when addressed proactively.⁵¹ Finally, as the current wrangling over the VH-71 presidential helicopter proves once again, all agreements are subject to constant maintenance and review.⁵² But in the end, as stated by the Department of Defense in its 1989 report on “Buy American” restrictions, “The United States could not build Fortress America even if this were a desirable object. Nor could the Department of Defense reverse worldwide economic trends, such as the internationalization of manufacturing.”⁵³

The first step to global production warships is to separate high-tech combat and mission systems from the remainder of the vessel. The Navy is already starting down this path with the introduction of “mission modules” for the Littoral Combat Ship (LCS). This allows the Navy to build a multimission hull, specialized for given tasks by swapping modules in and out. This partitioning would have the additional advantage in a foreign-sourcing context of separating export-sensitive technology. The Navy can foreign-source a hull without export-restriction issues. This concept also isolates within the mission modules any requirement changes involving high-tech development. Separating risk in this way would improve the Navy’s ability to manage cost growth associated with requirements-and-mission creep, as identified in Admiral Mullen’s contingency plan. It would also facilitate replacing outdated combat systems during overhaul periods.⁵⁴ This in turn would reduce modernization costs required to keep surface combatants fully mission capable over their entire intended service lives. Achieving full service life reduces O&M costs, at least for new ship classes, again per the Navy’s contingency plan.

The second step is to procure the hull abroad. Our quick calculation showed that the Navy can reduce costs by buying hulls from foreign sources, buying combat systems domestically, and then paying a domestic shipyard to fit out the hulls with its systems and set them to work. Unfortunately in the case of LCS, hulls were bought domestically. Just four months after launching the first ship, the Navy was forced to issue a stop-work order and then subsequently cancel LCS-3 because of significant cost overruns on the construction of LCS-1 and

projections for LCS-3.⁵⁵ Speculation puts “significant” at anywhere from an additional \$100 million to \$200 million.⁵⁶

One of the most important challenges facing the U.S. Navy is recapitalizing the fleet for the future. Whether the service decides to remain based on nuclear aircraft carriers or change its focus to alternative vessels, it will need to build ships—and shipbuilding costs continue to rise. The Navy understands that it is unlikely to receive additional shipbuilding funds. Therefore, its current approach to building the fleet involves “nested” strategies to contain shipbuilding costs, generate business efficiencies, and free up funds from other areas. To do so the Navy must, as we have seen, limit increases in personnel costs, prioritize shipbuilding budgets and stabilize construction rates, limit increases in operations and maintenance costs, reduce research and development funding, and prevent requirements creep and cost growth. This shipbuilding strategy is fraught with risk. It is contingent upon factors the Navy may influence but cannot control. Worse still, it does not exploit U.S. defense industry strengths; it trades away high-tech competitive advantage for what is at best heavy industry parity.

In 1988 President Ronald Reagan stated, “Even if we could afford, economically and militarily, to chart our National Security Strategy without allies—which we cannot—we would not want to do so.”⁵⁷ Twenty years later, the “Thousand-Ship Navy Global Maritime Network” and the global production of new ships both support that implied desire for cooperation in a new maritime strategy.⁵⁸ In the thousand-ship navy, cooperation is achieved as a “fleet” regionally coalesces behind common security goals and objectives. In global production, cooperation is further enhanced by market economics. In the worldviews of the United States and its partners, security and economics are mutually supporting, and both are compelling. They are two sides of the same coin. If a “thousand ships” can work, so can a “thousand shipyards.”

NOTES

1. Jeffrey D. Sachs, “The Geography of Economic Development,” in *Strategy and Force Planning*, ed. Security, Strategy, and Forces Faculty, 4th ed. (Newport, R.I.: Naval War College Press, 2004), p. 266.
2. *Ibid.*, p. 264.
3. For the purposes of this article consideration of foreign shipbuilding will be limited to conventionally powered surface craft and will exclude nuclear-powered aircraft carriers and submarines.
4. *The National Strategy for Maritime Security* (Washington, D.C.: White House, September 2005), p. 1. Available at www.whitehouse.gov/homeland/maritime-security.html.
5. U.S. Navy Dept., *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY2007* (Washington, D.C.: 6 February 2006).

6. U.S. Navy Dept., *CNO's Posture Hearing FY 2007 Budget*, statement of Admiral Michael G. Mullen, Chief of Naval Operations, before the House Armed Services Committee, 1 March 2006, p. 17, available at www.navy.mil/navydata/cno/mullen/testimony/ [original emphasis]. FORCENet: "The operational construct and architectural framework for Naval Warfare in the Information Age, to integrate warriors, sensors, networks, command and control, platforms, and weapons into a networked, distributed combat force, scalable across the spectrum of conflict from seabed to space and sea to land." Naval Network Warfare Command, *FORCENet*, forcenet.navy.mil/fn-definition.htm.
7. U.S. Government Accountability Office [hereafter GAO], *Defense Acquisitions: Challenges Associated with the Navy's Long-Range Shipbuilding Plan*, Statement of Paul L. Francis, Director Acquisition and Sourcing Management, testimony before the Subcommittee on Projection Forces, Committee on Armed Services, House of Representatives, GAO-06-587T (Washington, D.C.: GAO, 30 March 2006), available at www.gao.gov/new.items/d06587t.pdf.
8. New construction excludes conversion programs and nuclear refueling. The number actually reported was \$13.4 billion, which the Congressional Budget Office assumed was in 2005 dollars. For all analyses it uses 2007 dollars, which equates to \$14.4 billion. Eric J. Labs, *Resource Implications of the Navy's 313-Ship Plan* (Washington, D.C.: Congressional Budget Office, 16 December 2005), p. 1.
9. *Ibid.*, p. 3.
10. GAO, *Defense Acquisitions*.
11. *Ibid.*
12. Ronald O'Rourke, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress* (Washington, D.C.: Congressional Research Service, 16 August 2006), p. 16.
13. GAO, *Defense Acquisitions*, p. 6.
14. *Ibid.*, p. 5.
15. *Ibid.*, p. 7.
16. The figures were \$8.9 billion in 2007 and \$85 billion in 2007, compared to \$17.2 billion in 2011 and \$100 billion in 2010. *Ibid.*, p. 6.
17. Adam Talaber, *The Long-Term Implications of Current Defense Plans and Alternatives: Summary Update for Fiscal Year 2007* (Washington, D.C.: Congressional Budget Office, October 2006), p. 3.
18. "Navy Sets Shipbuilding Goals Requiring Big Funding Boost," GovExec.Com, *Daily Briefing*, 8 February 2006, www.govexec.com/dailyfed/0206/020806cdam1.htm.
19. Robert Work, *Know When to Hold 'Em: Modernizing the Navy's Surface Battle Line* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 20 September 2006), p. 3.
20. *Ibid.*, p. 1.
21. Mark V. Arena, *Why Has the Cost of Navy Ships Risen? A Macroscopic Examination of the Trends in U.S. Naval Ship Costs over the Past Several Decades*, RAND Report MG-484 (Santa Monica, Calif.: RAND, 2006), p. xviii.
22. Industrial College of the Armed Forces [hereafter ICAF], *Shipbuilding 2006* (Washington, D.C.: National Defense University, Spring 2006), pp. 2-4.
23. *Ibid.*, p. 2.
24. *Ibid.*, p. 3.
25. ICAF, *Shipbuilding 2005* (Washington, D.C.: National Defense University, 2005), p. 8.
26. ICAF, *2002 Industry Studies: Shipbuilding* (Washington, D.C.: National Defense University, 6 November 2002), p. 2.
27. U.S. Defense Dept., *Global Shipbuilding Industrial Base Benchmarking Study Part I: Major Shipyards* (Washington, D.C.: Office of the Deputy Under Secretary of Defense [Industrial Policy], Spring 2006), p. vii, available at www.acq.osd.mil/ip.
28. ICAF, *Shipbuilding 2006*, p. 3.
29. *Ibid.*, p. 1.
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31. Based on the average annual increase in "real terms" from FY 1961 to FY 2002. Arena, *Why Has the Cost of Navy Ships Risen?* p. xvi.

32. John Birkler, *Differences between Military and Commercial Shipbuilding: Implications for the United Kingdom's Ministry of Defence*, RAND Europe Report MG-236 (Santa Monica, Calif.: RAND, 2005), p. 67.
33. ICAF, *Shipbuilding 2001* (Washington, D.C.: National Defense University, 2001), p. 11.
34. ICAF, *Shipbuilding 2006*, p. 10.
35. Ibid.
36. *The National Security Strategy of the United States of America* (Washington, D.C.: White House, 1988), p. 2.
37. The fundamental difference between international trade and the globalization of production is that not only raw materials and finished products cross international borders but also unfinished products in various stages of manufacture. For example, cotton harvested in one country may cross one border to be made into cloth, then another border to be cut into pieces, another to be assembled into a shirt, and another finally to be brought to market.
38. Sachs, "The Geography of Economic Development," p. 264.
39. Robert Jervis defines the "great powers" as the United States, Western Europe, and Japan. Russia and China are not great powers, because of the unknown stability of their regimes. Jervis, "Theories of War in an Era of Leading-Power Peace," *American Political Science Review* 96, no. 1 (March 2002), pp. 1–13.
40. Stephen G. Brooks, *Producing Security: Multi-national Corporations, Globalization, and the Changing Calculus of Conflict* (Princeton, N.J.: Princeton Univ. Press, 2005), p. 5.
41. Douglas E. Mason, "Marine One," *Case Studies in Policy Making & Process*, 9th ed. (Newport, R.I.: Naval War College, National Security Decision Making Department, 2005), p. 271.
42. Harry Pember, *Seventy Five Years of Aviation Firsts* (Stratford, Conn.: Sikorsky Historical Archives, 1998), as cited in Mason, "Marine One."
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44. U.S. Commerce Dept., *National Security Assessment of the Domestic and Foreign Sub-contractor Base* (Washington, D.C.: 1992), as cited in Brooks, *Producing Security*, p. 91.
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46. U.S. Commerce Dept., *National Security Assessment of the U.S. Shipbuilding and Repair Industry*, executive summary, p. 9.
47. The notion that "purchasing hulls overseas and adding systems in the U.S. could reduce costs" is briefly mentioned in ICAF, *Shipbuilding 2006*, p. 10.
48. Ibid., p. 6.
49. Royal Australian Navy officer attending the Naval War College's Naval Command College, conversation with the author, January 2007.
50. Brooks, *Producing Security*, pp. 100–103.
51. Ann Roosevelt, "Senate Defeats Buy American Amendment," *Defense Daily*, 23 June 2004, p. 1.
52. Christopher J. Castelli, "Winter Rules Out Moving VH-71 Production Overseas," InsideDefense.com, 28 March 2007.
53. U.S. Defense Dept., *The Impact of Buy-American Restrictions Affecting Defense Procurements* (Washington, D.C.: Office of the Secretary of Defense, July 1989), as cited in Brooks, *Producing Security*, p. 91.
54. ICAF, *Shipbuilding 2006*, pp. 13–15.
55. The stop-work order to Lockheed Martin applied only to increases beyond the anticipated \$220 million and \$197 million for LCS-1 and LCS-3, respectively. General Dynamics, as the second contractor, is continuing work. It should be noted the GD version of LCS is of Australian design and is being manufactured in Mobile, Alabama, at Austal Shipyard, a subsidiary of Austal, Australia. U.S. Navy Dept., *Navy Statement on LCS Stop Work Order* (Washington, D.C.: 12 January 2007), available at InsideDefense.com; and U.S. Defense Dept., *Navy Terminates Littoral Combat Ship 3* (Washington, D.C.: Office of the Assistant Secretary of Defense (Public Affairs), 12 April 2007) available at GlobalSecurity.org.
56. Figures apply to Lockheed Martin ships only. General Dynamics' first ship is expected to

cost under \$300 million and its second around \$250 million. Christopher P. Cavas, "LCS Hits 'Considerable Cost Overruns,'" *DefenseNews.com*, 11 January 2007.

57. *National Security Strategy of the United States of America*, 1988, p. 2.

58. John G. Morgan, Jr., and Charles W. Martoglio, "The 1,000 Ship Navy Global Maritime Network," *U.S. Naval Institute Proceedings* 131, no. 11 (14 June 2005), pp. 14–17.