

# Fighter Jets, Supercars, and Complex Technology

*Ian MacMillan*

## Abstract

The history of America's joint fighter programs is one marred by cost overruns, late deliveries, and cancellations. A neoliberal component of American political culture provides rhetoric to argue these are symptoms of public-sector management; furthermore, private-sector models offer greater efficiency standards. However, the public-private distinction is largely hyperbole. Especially with complex technological projects, neither sector is invulnerable to inflated costs and schedule slippage. Through a "Most Different Systems Design" method, this article compares the Joint Strike Fighter program to Honda's arduous journey to design a second-generation Acura NSX supercar. As a "plausibility probe," the findings in this article offer a starting point for further research examining public- and private-sector commonalities. There are problems with the F-35, but this should come as no surprise. Like modern supercars, complex weapons are not designed and built overnight. With patience, there can be a silver lining. Years of redesigns, cancellations, and more redesigns can eventually lead to revolutionary new capabilities. Many close to the Joint Strike Fighter agree that something special will emerge. Although the impatience directed toward the JSF program is politically effective, it is a poor basis for sound policy making. Given the strategic imperativeness of the F-35, patience is essential. The financial sacrifice is a modest trade-off necessary to maintain US airpower competitiveness.

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"It's been a scandal and the cost overruns have been disgraceful."<sup>1</sup>  
Heavily critical of the Joint Strike Fighter (JSF) program's expensive,

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Ian MacMillan is a PhD candidate in strategic studies at the University of Calgary, Canada. His primary research interests include defense procurement, international relations, and culturally based analysis of government decision making. MacMillan's background in political science is complemented by his years as a media and policy analyst with Canada's federal public service.

15-year development schedule, Sen. John McCain has led a chorus seeking to eliminate the F-35's program office. In December 2016, accusing the JSF program of being "out of control," president-elect Donald Trump Tweeted a Boeing alternative was being considered.<sup>2</sup> In January 2017, the president suggested Boeing's Super Hornet could be equipped with stealth capabilities and replace the F-35.<sup>3</sup> Impatience with the JSF is understandable, but forgoing the capabilities of the F-35 may harm America's national interest.

The situation is not unique. Specifically, the history of America's joint fighter programs is one marred by cost overruns, late deliveries, and cancellations.<sup>4</sup> Condemnation of complex military programs like the JSF reflects a neoliberal political culture, critical of public spending in general.<sup>5</sup> Neoliberal proponents would argue JSF problems are symptomatic of poor public-sector management. Moreover, private-sector models would mitigate America's chronic problem with defense procurement.<sup>6</sup> Flowing from neoliberalism—an ideology with roots in American culture but which primarily emerged in the 1980s—New Public Management was envisioned as a system to "reconfigure the state along more cost-efficient (and effective) lines."<sup>7</sup> Henceforth, public spending habits were generally characterized as wasteful, and they continue to be held in sharp contrast to private-sector efficiency. *Prima facie*, this characterization is satisfying. It is easily understood and appeals to a critical mass of middle-class voters. However, the historical record shows that private-sector projects can also experience problems with delays and cancellations.

One example of a private-sector counterpart to the JSF is the Honda Motor Company's Acura NSX project. Through a comparative approach known as the "Most Different Systems Design," this article helps demonstrate that both public and private sectors can experience setbacks with complex technological projects.<sup>8</sup> The Honda case is appropriate because it is a private-sector company with multiple decades of success as an automobile manufacturer, especially its revolutionary first generation NSX. In spite of being a skilled and experienced company, designing an innovative and cutting-edge next-generation NSX led to schedule delays, redesigns, cancellations, and more redesigns before any success. There are other examples of private-sector companies experiencing design problems. But, before extensively researching additional private-sector cases, this "plausibility probe" acts as an effective method for exploring the suitability of the hypothesis: private-sector companies like

Honda experience design setbacks.<sup>9</sup> The strength of neoliberal political culture helps us forget that, especially with complex technology designs, both public and private sectors can be burdened by ambitious goals and ambitious delivery schedules.

To begin, this article will examine the main problem neoliberalism poses, for the public sector and for the JSF more specifically. To clarify the outlook toward delayed public-sector projects, a short history of neoliberalism in the US must be provided. The two case studies and results will follow. Although the impatience directed at the JSF program is politically effective, it is a poor basis for sound policy making. Given the strategic imperative of the F-35, patience is essential.

### **The Problem of Neoliberalism in American Politics**

In spite of considerable literature pertaining to American military procurement, as well as how culture shapes military doctrine and innovation, yet to be addressed is the problem neoliberal politics poses for military procurement in the United States.<sup>10</sup> The neoliberal proposition is so classically American in logic and assertion, and comes up so frequently, that it must be addressed to move on to a more factual and fully analytic debate that can lead to better outcomes in the future.

The neoliberal tone in which the JSF program is criticized is not new or particular to American military procurement. Neoliberal political culture emerged several decades ago, henceforth providing rhetoric designed to reduce government spending and shift remaining programs toward private-sector type business practices.<sup>11</sup> Although there is a certain noble quality in serving the national interest through efficient government spending—especially in an era in which the American national debt has reached a critical phase—the JSF criticism is a problem. It perpetuates an oversimplified perspective that public-sector programming should somehow meet a set of unrealistic efficiency standards attained in the private sector. As John A. Alic notes, a private-sector approach toward military procurement began before President Ronald Reagan with Robert McNamara's attempt to enforce the use of business planning to support national security objectives. It was largely unsuccessful. Emulating private-sector practices may work with routine contracts, but it fails to effectively approach the complexity of major acquisition programs like the JSF.<sup>12</sup> In the particular case of military technological production, the private-sector practices lauded by neoliberal political culture do not

necessarily improve program efficiency. Rather, they may serve to strain further an industry already operating under challenging conditions.<sup>13</sup>

Between 1960 and 2010, 27 studies on defense procurement in the United States were completed. In 2011, Harvard professor J. Ronald Fox reviewed these studies; he concluded major defense programs require more than 10 years to deliver less capability than planned, at two to three times the initial cost. It could be argued that scheduling and cost goals established, generally in the beginning stages of military technology programs, are overly ambitious.<sup>14</sup> Private-sector practices will not necessarily alleviate the challenges posed by inventing complex military technology. Delays are a common reality. However, the inveterate quality of neoliberal politics in American political culture consigns alternative perspectives to a position of anathema.

The distinction between public and private organizations is embedded in the social fabric of American culture.<sup>15</sup> The country's collective imagination is one characterized by self-reliance, entrepreneurship, and private enterprise. Emphasizing a limited and accountable government from its point of inception, the United States instilled Lockean classical liberalism.<sup>16</sup> In an ironic twist, the continued operationalization of America's entrepreneurial spirit necessitated greater public institutional involvement. In tandem with a creeping reliance on public services, stronger federal control continued throughout the better part of the twentieth century. Governmental involvement became a matter of course in both domestic and international arenas.

The end of the Second World War gave rise to the welfare state, strengthening the position of public-sector involvement in society. Through a comprehensive tax system and a burgeoning bureaucracy, the American government—and other western governments for that matter—were able to ensure unprecedented economic development, employment, and social security. This creation of a “social domain” was a hedge against the risks of an industrial economy, pooling collective responsibility to ensure individual reimbursement. But during the late twentieth and early twenty-first centuries, socially oriented programs came under attack for supposed inefficient government spending.<sup>17</sup> As Donald Warwick notes, “Critics claim that governmental organizations become the master rather than the servant of the people, stifle initiative, inculcate fear, multiply reporting requirements, circumscribe action, waste time, and deplete the federal treasury.”<sup>18</sup> There was a growing concern that,

in addition to draining public resources, social programming interfered with free market expansion, stifled entrepreneurialism, and encouraged dependency on the government at the cost of individual autonomy.<sup>19</sup>

In step with economist Milton Friedman, the 1980s saw western leaders such as Ronald Reagan and Margaret Thatcher endorse a neoliberal governmental approach, one that downplayed the value of large, public-sector projects.<sup>20</sup> Stated simply, the idea was that national economic prosperity was linked to attaining smaller fiscal deficits by decreasing public-sector reliance through privatization, thus containing government spending.<sup>21</sup> Self-reliance, entrepreneurship, and private enterprise returned as the thematic lodestars of future prosperity. Reagan argued against the idea that big business and big labor required big government.<sup>22</sup>

Of course, total abolishment of public-sector responsibility never occurred. But the idea that the public sector was inefficient gained a foothold. Stressing the utility of a private-sector management style, neoliberal proponents argued a New Public Management system would enable governments to achieve parsimony in resource use by, among other things, the cutting of direct costs and the enhancement of labor discipline via the resistance of union demands.<sup>23</sup> The one-dimensional characterization of the private enterprise as the harbinger of fiscal efficiency generated a narrative still used to undermine public-sector spending. Programs falling behind schedule and accruing unanticipated costs are characterized as a product of government mismanagement.<sup>24</sup> Sometimes these assessments are correct, but there are exceptions.

### **America's Joint Strike Fighter Program**

Speaking at an April 2016 Senate Armed Services Committee meeting, Republican Sen. John McCain led a withering critique of the JSF program. Indeed, the F-35 has been plagued by several notable development problems, causing delivery delays since its inception in 2001.<sup>25</sup> However, it stands to reason that fighter-jet technology is complex, not to mention short take-off and vertical landing (STOVL) as a necessary component in the creation of a stealthy, multi-role fighter.

The JSF program emerged in the restrictive budgetary environment at the end of the Cold War. Individual fighter programs were incongruent with other political goals. Although the United States Navy (USN), the United States Air Force (USAF) and the United States Marine Corps (USMC) had differing aircraft objectives, fiscal frugality imposed a mar-

riage of convenience. Whereas the USMC wanted a STOVL enhanced aircraft, the USAF desired stealth. The USN predominantly wanted something with a robust airframe. The outcome of these disparate desires was the Pentagon establishing the JSF program in March 1996 and issuing a request for proposal for a design prototype shortly thereafter.<sup>26</sup> In a winner-takes-all competition, Boeing and Lockheed Martin were selected to construct the JSF prototypes and compete to build the production aircraft. The initial deadline to submit their prototypes was 2000 so a winner could be selected in March 2001.<sup>27</sup>

Problems designing and testing the STOVL component postponed the submission of flight test data until July 2001. Delayed slightly by the 9/11 attacks, Pentagon Acquisition Chief Pete Aldridge's announcement of the winner was made in October 2001.<sup>28</sup> Lockheed Martin was granted a 126-month, \$13 billion contract.<sup>29</sup> What emerged over the course of a decade and a half was the F-35 family, composed of three single-seat variants with unique and complex characteristics to match the requirements of the USAF, USMC, and USN. Designed for the USAF, the most basic variant is the F-35A. Because it operates from conventional runways, it only requires conventional take-off and landing capabilities. However, unlike the USMC and USN versions, the F-35A was designed to carry an internally housed cannon to provide close air support for ground troops. This also means it can hold less fuel.<sup>30</sup>

The F-35B was designed for the Marines. In desperate need of a Harrier replacement, the USMC required an aircraft capable of providing STOVL so it could operate from austere, short-field bases and a range of air-capable ships operating near frontline combat zones. STOVL was made possible through a Rolls Royce-patented, shaft-driven "LiftFan" propulsion system and an engine that can swivel 90 degrees when in STOVL mode. Including this LiftFan required the variant to have a smaller internal weapon bay and even less internal fuel capacity than the F-35A.<sup>31</sup>

The F-35C was designed to be the Navy's first ever fifth-generation, radar-evading stealth aircraft, capable of long-range missions and built explicitly for aircraft carrier operations. It was also designed to be the Navy's first-day-of-the-war strike fighter, capable of overcoming a variety of threats (such as surface-to-air and air-to-air missiles), thereby opening up the battlefield for non-stealth aircraft. To enhance survivability and mission success, the F-35C combined stealth, advanced jamming, and threat system destruction. This variant has a larger wingspan and more

robust landing gear than the other variants, making it suitable for catapult launches and fly-in arrestments. Its wingtips also fold to allow for more room on the carrier's deck. Accommodating nearly 20,000 pounds of fuel internally, the F-35C has the greatest internal fuel capacity of the three variants, giving it longer range than any other fighter in a combat configuration. Like the F-35B, the F-35C uses probe and drogue refueling; this allows the USN to operate its carriers a safe distance from the threat while its fighters reach remote targets.<sup>32</sup>

That the Pentagon's JSF program constitutes an egregious mismanagement of public money is a false assumption. A program of this magnitude—a single airframe that operates across services and mission sets—is not a simple undertaking, and it is well known that military technology takes time to perfect. Furthermore, if the past is any indication of future events, current problems (such as software deficiencies, F-35B fuel tank redesign, lightning strike vulnerability, flight control problems, helmet display issues, component unreliability) are not insurmountable. When Lockheed Martin was contracted to develop a stealth fighter, completing the task was not a foregone conclusion. As the makers of the F-117 Nighthawk and B-2 Spirit know all too well, stealth technology presents a considerable challenge in aeronautical design. A problem faced early on by the JSF program was designing an aircraft that could evade radar, while carrying sufficient payloads and fuel for mission proficiency, and still reach supersonic speed. Different from most previous fighters (for example, F-14 Tomcat, F-16 Falcon, and F/A-18 Super Hornet), a stealthy F-35 required a larger and heavier airframe, one capable of storing all necessary weapons and fuel internally. The entire F-35 had to be scaled up to make room for a weapon bay able to carry a 5,000-pound payload. Since carrying drop tanks was out of the question, the plane had to include enough room for large internal fuel tanks. With a maximum takeoff weight of 60,000 pounds, the F-35 is considerably heavier than its non-stealthy predecessors.<sup>33</sup> To ensure the F-35 could both fly at a reasonable pace as well as deliver its payload, it was equipped with the Pratt & Whitney F135 engine. With a maximum thrust of over 50,000 pounds, this engine became the most powerful ever installed in a fighter aircraft as of 2010.<sup>34</sup>

Developing this engine took many years, and success in its creation was by no means guaranteed. For instance, the Pratt & Whitney F135-400 engine used for carrier-based operations faced issues with “pop stalls.”<sup>35</sup> A

pop stall is when an aircraft's engine stops working as a result of hot gas ingestion. USN aircraft carriers use something called a launch catapult system to get aircraft airborne. The steam emitted from this system can cause a pop stall. Since the F-35 was designed as a single-engine aircraft, a pop stall created considerable risk as far as losing the aircraft and even the pilot during takeoff. To solve this, a risk-reduction team was assembled to evaluate the pattern of steam during an aircraft launch. Engineers from Lockheed Martin, Pratt & Whitney, General Electric, and NAVAIR cooperated to test and reduce the risk for the F135 engine. An additional problem occurred in June 2004 when the Pratt & Whitney F135-600 engine used for the STOVL F-35B variant experienced an "erosion problem" caused by the size of the restrictor plate that regulates the flow of cooling air to certain parts of the engine. The plate was undersized and was therefore not allowing enough cool air to reach the second-stage vanes of the turbine section. A revised restrictor plate was put in place, and the engine was permitted to rejoin testing.<sup>36</sup>

In January 2016, the Pentagon's Office of the Director of Operational Test and Evaluation (DOT&E) released its annual report for fiscal year 2015. Regarding the JSF program, the report listed a variety of problems and technical glitches and was largely viewed as a testimony to the program's supposed failure.<sup>37</sup> For instance, in 2011 it became clear that Rockwell Collins—the company contracted to build the F-35's Helmet Mounted Display System—was experiencing technical setbacks. Problems with "jitter," "alignment," the ability to set "symbology intensity," "latency in imagery projections," and performance of the night vision camera convinced Pentagon officials to hire BAE Systems to build a back-up helmet. Two years later, improvements in the helmet led the Pentagon to continue with Rockwell Collins. The DOT&E report noted that following Generation III testing, developmental test pilots reported significant improvements in the helmet.<sup>38</sup>

In spite of overall improvements, the Senate Armed Services Committee submitted a bill to disband the F-35 program office after the F-35 reaches full-rate of production in April 2019. Notwithstanding President Trump's Twittersphere campaign to drive down the cost of the F-35, McCain's bill was a dramatic move. Responsibility for follow-on modernization of the three F-35 variants—estimated to cost more than \$8 billion for the first block upgrade—would be taken from the Department of Defense (DOD) and given to the Navy and Air Force, to be



treated as separate defense acquisition programs.<sup>39</sup> A summary of the bill states, “Devolving this program to the services will help ensure the proper alignment of responsibility and accountability the F-35 program needs and has too often lacked. . . . Given the Department of Defense’s poor track record on upgrade programs like this one, a separate program will enable rigorous oversight by the Congress to protect taxpayers.”<sup>40</sup> As one journalist argued, “The move is a shot across the Pentagon’s bow.”<sup>41</sup> John Alic argues the major lesson of the past half century is sensible military acquisition begins with increased power of civilian officials, not increased influence of the military services or even emulation of private sector practices.<sup>42</sup>

Discussing neoliberalism was a way for this article to bring a degree of clarity to McCain’s and Trump’s reactions to JSF program delays. Although neither are necessarily strictly neoliberal guided politicians, their words and demeanour toward the JSF program echoed that brand of ideology. Criticizing government programs for running over budget is effective political maneuvering but not necessarily an approach that translates into sound public policy. Shifting responsibility from the DOD to the Air Force and Navy—or choosing the older Super Hornet over the JSF—is more of a punishment than an optimal policy decision. There is no reason to believe the service branches will improve any aspect of a program that is more or less on track. And in spite of Boeing’s 2013 Advanced Super Hornet concept, which generated a 50 percent improvement in stealth, the Super Hornet is still a fourth-generation fighter—same axe head, new handle.<sup>43</sup>

Although it is important to hold programs to account—and McCain and Trump are likely doing a good job of that—there is a balance to strike between demanding a return on an investment and showing patience with an especially complicated piece of technology. It is not as though program management acted irresponsibly with public money. As evidenced by their testimony at the Senate Armed Services Committee, the JSF management team—Frank Kendall, Lt Gen Christopher Bogdan, and Dr. Michael Gilmore—publicly acknowledged production schedule shortfalls and took steps to correct them. Impatience therefore demonstrated a degree of myopic, short-term thinking. Despite the propensity for setbacks when designing new technology, it is a necessary investment—a factor the private sector is familiar with.

## **Honda's Acura NSX**

In January 1984, Japan's Honda Motor Company began research to develop an underfloor, midship-engine, rear-wheel drive sports car. Generally characterized as a practically oriented, front-engine/front-wheel drive, economical car company, Honda had returned to Formula One (F-1) racing just one year earlier. According to Honda engineer Shigeru Uehara, the company's aspiration in building a sports car was to bridge its mass production models with its F-1 cars. In addition, plans were being made to launch an Acura Division at American Honda, and the company needed a car that would serve as its flagship. After five years in design and development, the Acura NSX was unveiled at the 81st Chicago Auto Show in February 1989. With an elegant Pininfarina exterior that Honda claims was inspired by the F-16 fighter jet, the NSX was an instant success.<sup>44</sup> Many praised the car as revolutionary in that it irreversibly changed the supercar world. According to Motor Trend Channel's Johnny Lieberman, the 1989 Ferrari 348 represented a low point in Ferrari craftsmanship. Not only did the NSX perform better, it cost much less, did not break, and was easier to drive on a daily basis. "The NSX, in fact, blew people's minds. The entire industry sat up and took notice."<sup>45</sup>

A testament to the car's true original quality, between 1990 and 2005, only minor upgrades were made to keep the NSX popular. Unfortunately, in that time, the NSX was surpassed by many of its competitors, including a sedan by the Ford Motor Company: the 24-valve, double-overhead cam, V-6 Taurus.<sup>46</sup> Honda returned to the drawing board and in January 2007 unveiled the Acura Advanced Sports Car Concept. Boasting a powerful, front-mounted 5.0-liter V-10 engine, many assumed this to be the NSX successor. Later that year, Honda confirmed these assumptions and stated a possible introduction date of 2010. But the car was not well received.<sup>47</sup> Many did not like the exterior design, and supercar purists felt a front-mounted engine on an all-wheel drive car neglected Acura's powerful NSX lineage. Honda executives decided a second supercar concept would headline for Acura at the Tokyo auto show in October 2007, and not a production NSX as promised.<sup>48</sup>

In spite of making considerable advancements in a short period of time, by December 2008, CEO Takeo Fukui announced Honda would cancel the costly next-generation NSX program due to poor economic conditions. A strong Japanese yen caused US sales to plummet, and

Fukui cited a 67 percent drop in operating profits. But by early 2011, rumors of an NSX project revival were circulating. In April that year, Honda's president Takanobu Ito told *Automotive News* that an NSX successor was being developed but that it would be considerably different from previous designs. The difference Ito was alluding to was the pairing of Honda's 3.5-liter V-6 gasoline engine with a series of electric motors, making the car a hybrid.<sup>49</sup> This made the next generation NSX unique in the 2011 supercar world. But by mid-2012, new problems emerged. Needing to confront an era in which horsepower levels were increasing, NSX project leader Ted Klaus changed the performance targets and asked Honda's Japanese research and development executives for permission to add turbos. Permission was granted, but the problem Klaus soon discovered was that it is difficult to cool turbos on a transversely mounted V-6 engine. So Klaus scrapped the design again and started over, this time mounting the engine longitudinally.<sup>50</sup>

Honda finally unveiled its next generation NSX supercar at the North American International Auto Show in 2015. Although it received mixed-reviews, overall, the NSX was recognized as a complex masterpiece of modern engineering. In addition to a twin-turbo V-6 augmented by three electric motors for a total output of 573 horsepower, the NSX is host to computer software that changes everything from the drive mode to the electrohydraulic brakes. An additional piece of complex technology is the rapid torque vectoring system. The basic objective with torque vectoring is to enhance traction to improve high-speed handling by way of a computer that controls each of the front wheels individually: one can push forward while the other pushes back; they can both push forward; or they can both push back. This allows the computer to steer the NSX without the steering wheel moving.<sup>51</sup>

Honda's second generation NSX exemplifies the commonality of risk in developing new technology. SpaceX CEO Elon Musk anticipated the possibility of his Falcon 9 rockets crashing in the multiple attempts to execute mid-ocean landings on a robotic landing pad.<sup>52</sup> The company's fourth attempt in February 2016 ended in a fourth consecutive crash. Quick to determine the problem, SpaceX followed that crash with three successful landings in April and May 2016. Yet, problems persisted for Musk's ambitious plans.<sup>53</sup> Like the Falcon 9, the NSX required experimentation. Sometimes experiments pay off. As with the NSX, cancellations and redesigns were part of the process required to get it right. In

executing their vision for a new and profitable supercar, Honda executives had to be willing to scrap designs, wait for the right moment and start over. This required patience.

## **Results and Conclusions**

The idea that public sector–led projects are slow and expensive is not incorrect, though it is often overstated. The meaning we attribute to a measurement is often the product of an exercise in comparison. Though this comparison would benefit from additional cases in both public- and private-sector production, a plausibility probe works as an effective starting point before additional research is undertaken. Especially with new and complex technological projects, problems—regardless of sector—should be expected. This is not to say problems should be accepted out-of-hand. Just as a company’s shareholders are owed a return on their investment, a nation’s citizens are owed efficient output in exchange for their tax-dollars; one set of concerns is commercially oriented, the other affects the national interest. The US government spends several trillion dollars a year.<sup>54</sup> Although it is beyond the scope of this article to develop a broader understanding of those expenses, a sizable portion of the budget covers unanticipated costs in government programs. The mistake is concluding all unanticipated costs qualify as waste. Creating new and innovative technology is complicated and is therefore riddled with unforeseen consequences. It appears neither public- nor private-sector projects are excused from this burden.

The JSF program was given approximately 10 years to deliver three similar, but different, fighter jets; by 2016, the program was five years past its deadline. Each of the three variants had to have stealth capabilities while satisfying a series of branch-specific requirements. Whereas the F-35A had to make room for an internal cannon, the F-35C required a larger wingspan, more robust landing gear, folding wingtips, and a larger internal fuel tank. Even more problematic, the F-35B had to have a STOVL capability. For 15 years, with only minor and mostly cosmetic changes, Honda kept producing the same NSX model it designed in the late 1980s. After 2005, it took an additional decade of cancellations and redesigns to deliver a second-generation Acura NSX. In designing and constructing the NSX, Honda was being squeezed by the pressure of delivering another revolutionary supercar. Honda decided that a new NSX not only had to look different from its Pininfarina predecessor,

but it also had to somehow look as elegant while providing the complex computerized luxuries drivers were becoming accustomed to.

But the primary complication shared by both the JSF program and the Acura NSX project was designing technically sophisticated equipment capable of reaching the speeds required to remain competitive in their relative spheres. Designed to be a stealth fighter, the JSF required all components (e.g. gas tanks and munitions) to be carried internally. Honda's objective of designing a truly modern supercar required including a variety of electronic luxuries and computer systems (e.g. dynamic mode selector, computerized electrohydraulic brakes, and torque vectoring). Whereas the F-35's airframe had to be scaled up to carry its components internally, the NSX required significantly more horsepower than its predecessor in order to hold its new technical components. Both the F-35 and NSX required larger, more powerful engines. Major setbacks in the delivery schedule were the result of complications in designing and accommodating their respective engines.

Honda was able to work through its design problems. These took considerable time and effort, but the result was an exceptionally modern, yet fast and effective supercar. Likewise, technical glitches with the F-35's computerized systems continued to slow delivery. Problems with the helmet system, for instance, drew attention to the project's highly innovative qualities, leading some to ask why the United States required a fighter jet more complex than the F-16 or F/A-18. Although technical glitches caused delays, scathing vitriol proclaiming it a disgrace was unnecessary.


At \$400 billion for 2,457 aircraft, the program cost was almost twice the initial estimate.<sup>55</sup> But focusing on the price tag of an essential piece of military equipment distracts from the main issue, namely the F-35 is a vital component in the continuation of American military competitiveness.<sup>56</sup> Generally, "a state with airpower supremacy is in a position to dominate any location of its choosing by suppressing the naval and land forces of the opposing side."<sup>57</sup> The F-35 is an "engineering marvel"; its stealth technology will greatly increase strike capacity and lethality, thus providing the United States with continuing airpower competitiveness.<sup>58</sup> Specifically, the F-35 will not only be necessary in deterring Russian and Chinese aggression, but also it will be crucial to the success of overseas deployments. On the one hand, Russia, for instance, resumed its long-range bomber patrols near North American airspace in 2007.<sup>59</sup>

This concern has only been exacerbated by Russia's construction of a new long-range stealth bomber (the PAK-DA) in addition to resuming production of the Tu-160 Blackjack supersonic strategic bomber.<sup>60</sup> On the other hand, the proliferation of missile technology among irregular forces is increasing the danger of overseas deployments. As there is no compelling reason to believe the United States will altogether stop foreign military action, stealth capabilities will be an essential ingredient in the American airpower mix. In addition, the quantity and variety of American airpower will continue to be reduced, placing increased pressure on the level of sophistication in its remaining arsenal.<sup>61</sup>

There have been technological problems, and these have cost the US government considerably. This is the nature of inventing, designing, and producing complex, revolutionary technology.<sup>62</sup> Like the F-16, the F-4 Phantom, and the V-22 Osprey, examples of aeronautical design problems are the rule and not the exception. Indeed, it is the cost of doing business. But with these examples, we are also reminded that solutions are possible. The F-35 is certainly no exception to that. Congressional testimony from the JSF management team made clear the JSF program is progressing. Experts are solving problems as they arise and meeting evolving objectives, including demands for a lower "flyaway" cost.<sup>63</sup>

Americans, like Honda shareholders, deserve an honest account of how and where their money is spent. They also deserve successful returns. However, they are owed explanations of public spending that account for what the government is trying to achieve on a wider scale. On the surface, a budget-led acquisition approach appears sensible. Applying it to government spending coincides with a neoliberal political ideology that appeals to the millions of middle-class Americans trying to run their households in the face of rising living costs and stagnant wages. But the US government is not a household. It is the most powerful, and by extension the most threatened, nation-state in the system. In their article on the military's responsibility to lead technological development, Newt Gingrich and Ronald Weisbrook argue that to prevent the eclipse of American military supremacy requires a recapturing of the "urgency and capability of past national mobilization efforts."<sup>64</sup> Although "supremacy" may not be attainable or even necessary, US competitiveness is essential.<sup>65</sup> Remaining competitive requires the modest degree of patience necessary to support and complete important military technology programs. Just as late-nineteenth century economic

interests demanded a Mahanian three-link chain approach, twenty-first century security interests necessitate continual investment in sophisticated military technology.<sup>66</sup>

Contrary to neoliberal idealism, public-sector programs are not that different from their private-sector counterparts. Especially when new and innovative technologies are being designed, problems are often imminent. This is the cost of doing business. Honda looked carefully at the future of supercar ingenuity, realized the past's technology was going to be replaced, and decided to reach ahead by engineering something special. Succinctly stated by Seyth Miersma, executive editor at *Motor1*, "Acura's intricately driven NSX is a compelling preview of how sports cars will exist in the years soon to come."<sup>67</sup> The process of reaching ahead was challenging for Honda—but a worthwhile investment. The same can be said for the ongoing JSF program. Despite a number of significant problems, the US DOD has persevered to develop an aircraft that will replace aging equipment, revolutionize the way American fighter pilots conduct air warfare, and reaffirm American airpower capabilities in the emerging multi-polar system. Given the long-term strategic implications of the F-35 family, schedule setbacks constitute a modest sacrifice that deserves patience. In his last speech addressing national reunification following the Civil War, Abraham Lincoln said, "We shall sooner have the fowl by hatching the egg than by smashing it."<sup>68</sup> 

## Notes

1. Richard Lardner, "Senator Says Fighter Program Has Been Scandal and Tragedy," *Associated Press*, 26 April 2016, <http://bigstory.ap.org/article/5f64228336014b158de3d8b351e728e/senator-says-fighter-program-has-been-scandal-and-tragedy>.

2. Valerie Insinna, "Trump Makes the 'Out Of Control' F-35 His Latest Target," *Defense News*, 12 December 2016, <http://www.defensenews.com/articles/trump-makes-the-out-of-control-f-35-his-latest-target>.

3. David Pugliese, "Super Hornet Could Face Some Tough Opposition in the Battle against the F-35," *Ottawa Citizen*, 5 April 2017, <http://ottawacitizen.com/news/national/defence-watch/super-hornet-could-face-some-tough-opposition-in-the-battle-against-the-f-35>.

4. Mark A. Lorell, Michael Kennedy, Robert S. Leonard, Ken Munson, Shmuel Abramzon, David L. An, and Robert A. Guffey, *Do Joint Fighter Programs Save Money?* (Washington, DC: Rand Corporation, 2013).

5. Robert A. Dahl, and Charles E. Lindblom, *Politics, Economics and Welfare* (New York: Harper & Brothers, 1953); Anthony Downs, *Inside Bureaucracy* (Boston: Little, Brown, 1967); Richard E. Boyatzis, *The Competent Manager: A Model for Effective Performance* (New York: Wiley, 1982);

Emanuel S. Savas, *How to Shrink Government: Privatizing the Public Sector* (Chatham, NJ: Chatham House, 1982); Michael Keating, "Quo Vadis? Challenges of Public Administration," *Australian Journal of Public Administration* 48, no. 2 (June 1989): 123–31, <http://doi.org/d7shtn>; Thomas I. Palley, "From Keynesianism to Neoliberalism: Shifting Paradigms in Economics," *Foreign Policy in Focus* (May 2004), [http://fpif.org/from\\_keynesianism\\_to\\_neoliberalism\\_shifting\\_paradigms\\_in\\_economics/](http://fpif.org/from_keynesianism_to_neoliberalism_shifting_paradigms_in_economics/); Jonathan D. Ostry, Prakash Loungani, and Davide Furceri, "Neoliberalism: Oversold?," *Finance and Development* 53 no. 2 (June 2016): 38–41, <http://www.imf.org/external/pubs/ft/fandd/2016/06/pdf/ostry.pdf>; and Thomas Volscho, "The Revenge of the Capitalist Class: Crisis, the Legitimacy of Capitalism and the Restoration of Finance from the 1970s to the Present," *Critical Sociology* 43 no. 2 (2017): 249–66, <http://doi.org/cdb6>.

6. John A. Alic, "Managing US Defense Acquisition," *Enterprise & Society* 14, no. 1 (March 2013): 30, <http://www.jstor.org/stable/23701646>. Alic does not specifically mention neoliberalism, but he does discuss the problem with the assumption private sector models necessarily improve military procurement. He notes there could be an argument emulation of private firms would be appropriate for "relatively straightforward administrative functions, including the five million or so routine contract actions that Department of Defense (DOD) personnel execute each year, not for major acquisition programs." Alic uses the JSF program as an example of a major acquisition program.

7. Rhys Andrews and Stephen van de Walle, "New Public Management and Citizens' Perceptions of Local Service Efficiency, Responsiveness, Equity and Effectiveness" (working paper, Coordinating for Cohesion in the Public Sector of the Future [COCOPS], no. 7, June 2012), [http://www.cocops.eu/wp-content/uploads/2012/08/COCOPS\\_workingpaper\\_No7-.pdf](http://www.cocops.eu/wp-content/uploads/2012/08/COCOPS_workingpaper_No7-.pdf).

8. Carsten Anckar, "On the Applicability of the Most Similar Systems Design and the Most Different Systems Design in Comparative Research," *International Journal of Social Research Methodology* 11, no. 5 (December 2008): 389–401, <http://doi.org/drws9g>. Because the JSF program and the Acura NSX project are dissimilar in many respects, this article falls under the investigative rubric of the Most Different Systems Design. This method can be used to compare cases that, despite certain dissimilarities, possess the same dependent variable. The basic idea is to show that cases with different structural characteristics can generate similar outcomes.

9. Alexander L. George and Andrew Bennett, *Case Studies in Theory Development in the Social Sciences* (Cambridge, MA: MIT Press, 2005); and Jack S. Levy, "Case Studies: Types, Designs, and Logics of Inference," *Conflict Management and Peace Science* 25 (2008): 1–18, <http://doi.org/dd4wfx>. George and Bennet define a plausibility probe as a preliminary study on a relatively untested theory to determine whether more intensive testing is warranted. The theoretical purpose of this article is to show that both public- and private-sector technology projects experience delays and setbacks, a factor neoliberal political culture neglects to acknowledge. A plausibility probe is a way of developing this theory before approaching a multi-case analysis.

10. J. Ronald Fox, *The Defense Management Challenge: Weapons Acquisition* (Boston: Harvard Business School Press, 1988); Thomas L. McNaugher, *New Weapons, Old Politics: America's Military Procurement Muddle* (Washington, DC: Brookings Institutions, 1989); Elizabeth Kier, *Imagining War: French and British Military Doctrine between the Wars* (Princeton, NJ: Princeton University Press, 1997); Terry Terriff, "Innovate or Die: Organizational Culture and the Origins of Maneuver Warfare in the United States Marine Corps," *Journal of Strategic Studies* 29, no. 3 (2006): 475–503, <http://doi.org/c9xxns>; Alic, "Managing US Defense Acquisition"; Donald MacKenzie, *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance* (Cambridge, MA: MIT Press, 1990); Thomas Hone, Norman Friedman, and Mark Mandeles, *American and British Aircraft Carrier Development, 1919-1941* (Annapolis, MD: Naval Institute Press, 1999); and J. Ronald Fox, *Defense Acquisition Reform, 1960-2009: An*



*Elusive Goal* (Washington, DC: Center of Military History, United States Army, 2011). There is a considerable amount of literature examining American military procurement. As noted by Harvard faculty member J. Ronald Fox, a sizable amount of it includes studies commissioned by presidents, Congress, secretaries of defense, government agencies, studies and analyses organizations, and universities. One such study in particular is Fox's own *Defense Management Challenge*, which deals with the roles of government personnel in procuring military equipment, as well as various other aspects of the acquisition process, such as cost estimating. Other American military procurement literature deals with the interplay of the various organizations and players involved in procurement and suboptimal outcomes such as cost overruns, schedule slippage, and contract cancellations. Thomas McNaugher identifies the complex technical interaction between a military interested in improved weapons systems, a political sector focused on appeasing constituent interests, and a bureaucracy with procedural obsessions and parochial budgetary concerns. Despite this and other literature describing the bureaucratic political aspects of military procurement, the research dealing with American acquisitions has not yet addressed the effects neoliberal political culture has on acquisitions.

There is of course, a more than sufficient amount of literature examining the role culture plays in shaping the military, both in terms of the doctrines they pursue as well as the weapons acquired to pursue these doctrines. For example, Elizabeth Kier examines the role French and British political values played in forming interwar defense policy. Budget choices of course affected the doctrinal and military capabilities of the French and British forces, as well as what type of weapons they could afford, which largely dictated what they could do. Terry Terriff argues that following the Vietnam War the US Marine Corps was forced to adapt its mystical amphibious marine warfare culture by innovating towards a total mechanized force, emphasizing mobility and maneuver warfare.

John Alic notes there has been a modest number of works dealing with military technological innovation. Donald MacKenzie's book considers both technical and political-organizational issues of the nuclear missile age. He tries to show that continued innovation in missile technology is a product of institutional structures, not a natural course of evolution. Take away those structures, and nuclear missile innovation crumbles. Seeking to understand why the Royal Navy and US Navy went in different and unique directions with regard to aircraft carrier innovation, Thomas Hone, Norman Friedman, and Mark Mandeles examine the interaction between strategy, technological alternatives, and organizational politics. Alic's 2013 article argues the business models used in major DOD investments in innovation, such as the F-35 Joint Strike Fighter, are not necessarily compatible with major private-sector investment models. Reform, Alic states, would begin with legislation further limiting the influence of individual services over weapons choice, augmented by greater civilian control.

Alic carries his argument into his review of Ronald Fox's 2011 book on defense acquisition reform in the US. In analyzing 27 studies on defense procurement in the United States, Fox argues what the DOD requires is better trained defense acquisition managers, proficient in the complex and continuing negotiations between government departments and large industrial firms—moreover, managers that emulate private sector practices. Based on his own extensive research, Alic argues there is no evidence to suggest emulating private-sector management practices would guarantee better organizational performance.

Alic reminds us that following World War II, as civilian control over military procurement was slowly reasserted, elements of private-sector managerial practices followed close behind. As secretary of defense, beginning in 1961, Robert McNamara instituted administrative procedures, along with the planning, programming, and budgeting system, that evoked practices widespread in private industry. In spite of best efforts, procurement schedules remained

lengthy, and budgets continued to grow to cover their costs. It is here where this article on the JSF proceeds. The misconception that efficiency is intrinsic to private-sector practice and that if only the public sector could emulate such practice, programs would be delivered on time and on budget, is reflection of a neoliberal political culture. This article seeks to examine this contention through the JSF and NSX cases.

11. Palley, "From Keynesianism to Neoliberalism."
12. Alic, "Managing US Defense Acquisition," 30.
13. Robert Perry, Giles K. Smith, Alvin J. Harman, and Susan Henrichsen, *System Acquisition Strategies* (Santa Monica, CA: United States Air Force Project Rand and Advanced Research Projects Agency, June 1971): 39, <http://www.dtic.mil/dtic/tr/fulltext/u2/730921.pdf>.
14. Fox, *Defense Acquisition Reform*.
15. Bruce Buchanan II, "Red-Tape and the Service Ethic: Some Unexpected Differences between Public and Private Managers," *Administration and Society* 6 no. 4 (February 1975): 423–44, <http://doi.org/ft3thf>. Also see Elizabeth Kier, *Imagining War: French and British Military Doctrine between the Wars* (Princeton, NJ: Princeton University Press, 1997), 28. Kier defines culture as "a set of basic assumptions, values, norms, beliefs and formal knowledge that shape collective understandings."
16. Eva Brann, "A Reading of the Gettysburg Address," in *Abraham Lincoln, The Gettysburg Address, and American Constitutionalism*, ed. Leo Paul S. de Alvarez (Irving, TX: University of Dallas Press, 1976), 15–53; Walter R. Mead, *Special Providence: American Foreign Policy and How It Changed the World* (New York: Alfred A. Knopf); and John Locke, *Two Treatises of Government* (New York: Cambridge University Press, [1689] 1988). Thomas Jefferson, who composed the original draft of the Declaration of Independence, borrowed from seventeenth-century English political theorist John Locke. Locke's *Two Treatises of Government* argued that although people in the state of nature transferred some of their rights to a central authority in exchange for a stable society, government not only requires the consent of the governed but also must be restricted to a minimal role in society. Because individuals are rational and self-interested and therefore in the best position to care for themselves, classical liberals like Locke argued for limited state power, primarily ensuring the right to liberty and protection of property. Governments that failed in these duties or acted tyrannically—as in the case of British Monarch George III toward the Thirteen Colonies—had to be overthrown. This suspicious mindset exists to this day in the United States, sometimes to the benefit of the country, but not always.
17. Suzan Ilcan, "Privatizing Responsibility: Public Sector Reform under Neoliberal Government," *Canadian Review of Sociology* 46, no. 3 (August 2009): 207–34, <http://doi.org/cw3f29>.
18. Donald P. Warwick, *A Theory of Public Bureaucracy: Politics, Personality, and Organization in the State Department* (Cambridge, MA: Harvard University Press, 1975), 3.
19. Ilcan, "Privatizing Responsibility," 211.
20. Thomas Volscho, "The Revenge of the Capitalist Class: Crisis, the Legitimacy of Capitalism and the Restoration of Finance from the 1970s to Present," *Critical Sociology* 43, no. 2 (2017): 18, <http://doi.org/cdb6>.
21. Ostry, Loungani, and Furceri, "Neoliberalism: Oversold?." Also see Campbell Parker Jones and Rene Martin ten Bos, "For Business Ethics" (New York: Routledge, 2005).
22. Volscho, "Revenge of the Capitalist Class," 17; Gérard Duménil and Dominique Lévy, *The Crisis of Neoliberalism* (Cambridge, MA: Harvard University Press, 2011), 17; and John A. Alic, *Trillions for Military Technology: How the Pentagon Innovates and Why It Costs so Much* (New York: Palgrave MacMillan, 2007), 2, 10, 50. Although Duménil and Lévy refer to President Ronald Reagan as one of the "emblematic figures" of neoliberalism, Alic points out Reagan presided over a major defense buildup, even though the Cold War was coming to a close.

Cancelled by the Carter administration, the B1-bomber entered production when Reagan took office. Designed to outpace Soviet fighter technology, design work on the F-22 began in the early years of Reagan's presidency. By 1989, the defense budget had reached \$300 billion, a figure that was not increased until 2002. The irony is not lost. However, in politics, actions do not always reflect rhetoric. Sometimes circumstances change, and campaign promises get ignored. But other times, rhetoric can catch on with voters, requiring a president to follow through on a promise, even if it no longer makes sense to do so.

23. Christopher Hood, "A Public Management for All Seasons?," *Public Administration* 69, no. 1 (Spring 1991): 5, <http://doi.org/bdwbfj>.

24. See note 5.

25. Mia De Graaf and Mark Prigg, "John McCain Slams F-35 Striker Jet Project as "a Scandal,"" *Daily Mail Online*, 27 April 2016, <http://www.dailymail.co.uk/news/article-3562189/John-McCain-slams-F-35-striker-jet-project-scandal-disgraceful-aircraft-s-development-stretches-15th-year-costing-Pentagon-nearly-400-BILLION.html>.

26. Lorell, et al., *Do Joint Fighter Programs Save Money?*, 1. The US DOD has started numerous joint tactical fighter programs since the 1960s. The conventional wisdom behind these programs was that one common airframe could be used to support the needs of the USAF, USN, and USMC, with reduced costs. Savings would be found by "eliminating duplicate research, development, test, and evaluation (RDT&E) efforts and by realizing economies of scale." According to Lorell et al., this approach towards commonality and integration complicates already sizable technical challenges leading to cost growth that could negate potential savings. What these authors fail to acknowledge are the minor successes that emerged from ambitious joint programs like the Tactical Fighter, Experimental (TFX), and the Air Combat Fighter. In spite of a failure to achieve 100 percent commonality between a variety of service aircrafts, the TFX produced the highly successful F-111A as well as the incredibly successful A-10 from the close air support portion of the project. These projects are meant to supply American military needs, but they are also acknowledged to some degree as experimental. It is well known ahead of time there will be problems. Acting astonished after schedule slippage is asinine.

27. Bill Sweetman, *Ultimate Fighter: Lockheed Martin F-35 Joint Strike Fighter* (Saint Paul, MN: Zenith Press, 2004), 22–47.

28. *Ibid.*, 94. Interestingly, Pentagon acquisition chief Pete Aldridge's announcement stated the incorrect designation. The previous fighter in the US designation system was Northrop's YF-23A. The JSF should have therefore been the F-24. At the conference, a reporter asked Aldridge about the designation. Not knowing the answer off-hand, Aldridge turned to Program Director General Mike Hough. "Momentarily confused, Hough said 'X-35.'" Aldridge misheard him and stated the designation as F-35. Instead of the Pentagon admitting a mistake, the JSF office officially requested F-35 under the Mission Design Series, on the grounds that it was consistent with Aldridge's statement.

29. Gerard Keijsper, *Lockheed F-35 Joint Strike Fighter: Design and Development of the International Aircraft* (South Yorkshire, UK: Pen & Sword Aviation, 2007), 34.

30. "Conventional Takeoff and Landing Variant, F-35A Lightning II," Lockheed Martin, 2016, accessed 24 January 2017, <https://www.f35.com/about/variants/f35a>.

31. "Short Takeoff/Vertical Landing, F-35B Lightning II," Lockheed Martin, 2016, accessed 24 January 2017, <https://www.f35.com/about/variants/f35b>.

32. "Carrier Variant, F-35C Lightning II," Lockheed Martin, 2016, accessed 24 January 2017, <https://www.f35.com/about/variants/f35c>.

33. Andy Nativi, "F-35 Air Combat Skills Analyzed," *Aviation Week*, 5 March 2009, <http://aviationweek.com/awin/f-35-s-air-combat-skills-analyzed>.
34. Guy Norris, "Pratt Raises Stakes in JSF Engine Battle," *Aviation Week*, 27 August 2010, <http://aviationweek.com/awin/pratt-raises-stakes-jsf-engine-battle-0>.
35. Keijsper, *Lockheed F-35 Joint Strike Fighter*, 199.
36. *Ibid.*, 200–2.
37. Reuven Ben-Shalom, "Cultural Prism: Supremacy, Lethality and Transparency," *The Jerusalem Post*, 16 June 2016, <http://www.jpost.com/Opinion/Supremacy-lethality-and-transparency-457023>. Also see Director of Operational Test and Evaluation, *FY 2015 Annual Report* (Washington, DC: Department of Defense, 2016), <http://www.dote.osd.mil/pub/reports/FY2015/pdf/other/2015DOTEAnnualReport.pdf>.
38. Christian Davenport, "Meet the Most Fascinating Part of the F-35: the \$400,000 Helmet," *Washington Post*, 1 April 2015, <https://www.washingtonpost.com/news/checkpoint/wp/2015/04/01/meet-the-most-fascinating-part-of-the-f-35-the-400000-helmet/>. Also see Director of Operational Test and Evaluation, *FY 2015 Annual Report*, (Washington, DC: Department of Defense, 2016), <http://www.dote.osd.mil/pub/reports/FY2015/pdf/other/2015DOTEAnnualReport.pdf>.
39. Loren Thompson, "Why Sen. McCain Is Right in Trying to Put the Military Services in Charge of Buying Weapons," *Forbes*, 28 September 2015, <http://www.forbes.com/sites/lorenthompson/2015/09/08/why-sen-mccain-is-right-to-put-the-military-services-in-charge-of-buying-weapons/#3e056c692933>.
40. US Senate Committee on Armed Services, *National Defense Authorization Act for Fiscal Year 2017: Bill Summary* (Washington, DC, 2016), 11, <http://www.armed-services.senate.gov/imo/media/doc/FY17%20NDAA%20Bill%20Summary.pdf>.
41. Dave Majumdar, "US Senate Proposes to Disband F-35 Joint Program Office," *The National Interest*, 13 May 2016, <http://nationalinterest.org/blog/the-buzz/us-senate-proposes-disband-f-35-joint-program-office-16206>.
42. Alic, "Managing US Defense Acquisition."
43. Eric Tegler, "Could Trump Really Replace the F-35 with a Super Hornet? No. But also Yes," *Popular Mechanics*, 10 January 2017, <http://www.popularmechanics.com/military/aviation/a24682/f-35-vs-super-hornet/>.
44. "Let's Build a Sportscar!," Honda Corporation, 2005, <http://world.honda.com/history/challenge/1990thensx/index.html>.
45. Johnny Lieberman, "Lexus LFA versus Acura NSX!," 25 July 2012, in Motor Trend Channel's Head 2 Head, episode 13, video, 17:07, <https://www.youtube.com/watch?v=zLJ2lw0bCkk&index=9&list=PLXooetYap97WexVvxqJQs0zCsPySCYhDh>; and Jason Cammisa, "2017 Acura NSX: The Slowest Supercar in the World?," 7 December 2015, in Motor Trend Channel's Ignition, episode 143, video, 13:35, <https://www.youtube.com/watch?v=GUDLUSqfqxg>.
46. Lieberman, "Lexus LFA versus Acura NSX!"
47. Jake Holmes, "2010 Acura NSX: No Longer a Design Study, the New NSX Shows its Face," *Car and Driver*, June 2008, <http://www.caranddriver.com/spy-shots/2010-acura-nsx-spyed-1>.
48. Alissa Priddle, "Acura Supercar Concept, Part 2," *Car and Driver*, September 2007, <http://www.caranddriver.com/news/acura-supercar-concept-part-2-auto-shows>.
49. Jake Holmes, "Revival, Part Deux: Honda President Dishes on New NSX Successor," *Automobile*, 25 April 2011, <http://www.automobilemag.com/news/revival-part-deux-honda-president-dishes-new-nsx-successor-42779/>.
50. Aaron Robinson, "2016 Acura NSX Dissected: Powertrain, Chassis, and More," *Car and Driver*, April 2015, <http://www.caranddriver.com/features/2016-acura-nsx-dissected>

-powertrain-chassis-and-more-feature; and Cammisa, "2017 Acura NSX: The Slowest Supercar in the World?"

51. Cammisa, "2017 Acura NSX."

52. Maya Kosoff, "Elon Musk Wants You to Know His Rocket Will Probably Crash," *Vanity Fair*, 23 February 2016, <http://www.vanityfair.com/news/2016/02/elon-musk-wants-you-to-know-his-rocket-will-probably-crash>.

53. Ali Sundermier, "Here's Why SpaceX Crash Landed its Most Recent Rocket," *Business Insider*, 17 June 2016, <http://www.businessinsider.com/why-spacex-crash-landed-falcon-9-rocket>.

54. Jeanne Sahadi, "U.S. Deficit Now Lowest since 2007," *CNN Money*, 15 October 2015, <http://money.cnn.com/2015/10/15/news/economy/budget-deficit/>.

55. Ryan Browne, "John McCain: F-35 Is 'A Scandal and A Tragedy,'" *CNN Politics*, 27 April 2016, <http://www.cnn.com/2016/04/26/politics/f-35-delay-air-force/>.

56. Given the re-emergence of sophisticated Russian and Chinese weaponry, the rational cost of remaining competitive is continued weapons experimentation and development, an expensive proposition. Congressional anxiety based on cost overruns and schedule slippage not only reflects neoliberal ideals, but it also qualifies as a nonrational response because complex military technology like the JSF program is inherently risk oriented. Congress wants primacy but does not always accept the trade-offs necessary to at least remain competitive.

57. Rob Huebert, "The Future of Canadian Airpower and the F-35," *Canadian Foreign Policy Journal* 17, no. 3 (September 2011): 229, <http://doi.org/cdb8>.

58. Ben-Shalom, "Cultural Prism." It is predicted bi-static radar and infrared will impair stealth aircraft success more than in the past.

59. Reuters, "Russia Restores Bomber Patrols," CNN, 17 August 2007, <http://www.cnn.com/2007/WORLD/europe/08/17/russia.airforce.reut/index.html?iref=newssearch>.

60. Dave Majumdar, "Russia to Build Lethal PAK-DA Stealth Bomber—with Hypersonic Weapons?," *The National Interest*, 18 April 2016, <http://nationalinterest.org/blog/the-buzz/russia-build-lethal-pak-da-stealth-bomber%E2%80%94hypersonic-15821>.

61. Huebert, "Future of Canadian Airpower and the F-35," 232–4.

62. The term "revolutionary" is used here to describe something that irreversibly changes the nature of its respective field. For instance, a revolutionary piece of military technology irreversibly changes the nature of warfare. Also see Lorell, et al., *Do Joint Fighter Programs Save Money?* The TFX program had a similar problem providing maximum system commonality while meeting important individual service requirements. What began in June 1961 as a joint fighter program between the Air Force and Navy eventually led to a split in which the Air Force procured the F-111A and the Navy procured the F-14A Tomcat, a fighter with 20 per cent commonality to the F-111A. In spite of the split, the program led to two success stories. Given time, something good will come of the Joint Strike Fighter program.

63. Ben-Shalom, "Cultural Prism"; and Marcus Weisgerber, "The Price of an F-35 Was Already Falling. Can Trump Drive it Lower?," *Defense One*, 27 January 2017, <http://www.defenseone.com/business/2017/01/f-35s-price-has-been-falling-can-trump-lower-it-even-more/134919/>.

64. Newt Gingrich and Ronald E. Weisbrook, "Adapt or Die: The US Military's Responsibility to Protect America by Leading the Transformations in Science and Technology," *Strategic Studies Quarterly* 1, no. 2 (Winter 2007): 25, [http://www.airuniversity.af.mil/Portals/10/SSQ/documents/Volume-01\\_Issue-2/Winter07.pdf](http://www.airuniversity.af.mil/Portals/10/SSQ/documents/Volume-01_Issue-2/Winter07.pdf).

65. Stephen Walt, "American Primacy: Its Prospects and Pitfalls," *Naval War College Review* 55, no. 2 (Spring 2002): 9–28, <https://usnwc2.usnwc.edu/Publications/Naval-War-College-Review/2002---Spring.aspx>; Robert Farley, "Yes, America's Military Supremacy Is Fading (And

We Should Not Panic),” *The National Interest*, 21 September 2015, <http://nationalinterest.org/feature/yes-americas-military-supremacy-fading-not-its-superiority-13885?page=3>; and Kenneth Waltz, “Why Iran Should Get the Bomb,” *Foreign Affairs* 91, no. 4 (July/August 2012): 2–5, <https://www.foreignaffairs.com/articles/iran/2012-06-15/why-iran-should-get-bomb>. Others have argued perpetual US military primacy is not necessary. For instance, neorealist Stephen Walt questions whether “increasing the US lead” is worth the effort. He acknowledges the value of maintaining US strength in both relative and absolute terms but is hesitant to argue primacy is a long-term necessity.

Robert Farley argues the advantages of unipolarity and military supremacy the US enjoyed in the 1990s were ephemeral and an anomaly in the broader history of global politics. The shrinking gap between the United States, China, and Russia indicates a return to a more normal balance of power. Farley makes the distinction that while “superiority” is possible, “supremacy” is not a practical nor even a necessary goal.

Kenneth Waltz applies a similar logic to concerns over Iranian nuclear ambitions. Flowing primarily from the United States and Israel, concerns are partly based on the notion the Middle East and the world would be safer without a nuclearized Iran. Waltz argues this is simply not true. Israel would not be destroyed by an irrational Iranian first strike attack, and the world would not descend into chaos as an emboldened Iran supplied Shia terrorist groups with nuclear materials, and every state with a reasonable chance of building nuclear weapons would proliferate and attack one another.

As the twenty-first century continues to reveal a slightly more proportional balance of power, neither Israel nor the United States should expect continued supremacy. However, while superiority is possible, competitiveness is essential. The United States is in no way entitled to rely solely on complex interdependence. It must buttress its use of international institutions and trade relations with investments in key strategic assets such as the JSF.

66. Alfred Thayer Mahan, *The Influence of Sea Power upon History, 1660-1805* (Boston: Little, Brown, & Co., 1890; reprinted together with extracts from *The Influence of Sea Power upon the French Revolution and Empire, 1793-1812* [London: Hamlyn Publishing Group; A Bison Book, 1980]), 57. Greatly concerned the United States was squandering its opportunity to secure a piece of global economic dominance, nineteenth-century naval historian Alfred Thayer Mahan argued the undeniable relationship between commercial success and naval power required protection of America’s coastal approaches, harbors, and inlets; Mahan also emphasized home industrial production, shipping of industrial goods with naval protection and foreign bases, and colonies to provide material resources and marketplaces.

67. Seyth Miersma, “After an Interminable Wait, Acura’s Second NSX Is Here, and It’s Brought the Future with It,” Motor1.com, 23 May 2016, <http://www.motor1.com/reviews/62927/first-drive-2017-acura-nsx/>.

68. “Last Public Address, April 11, 1865,” Abraham Lincoln Online, accessed 11 January 2017, <http://www.abrahamlincolnonline.org/lincoln/speeches/last.htm>.

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The views and opinions expressed or implied in SSQ are those of the authors and are not officially sanctioned by any agency or department of the US government. We encourage you to send comments to: [strategicstudiesquarterly@us.af.mil](mailto:strategicstudiesquarterly@us.af.mil)