

Competition Policy Retrospective: The Formation of the United Launch Alliance and the Ascent of SpaceX

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Introduction

In May 2005, the Boeing Company (“Boeing”) and Lockheed Martin Corporation (“Lockheed Martin”) announced plans to form the United Launch Alliance (“ULA”), a joint venture which combined the only two suppliers of medium-to-heavy (“MTH”) national security-related launch services to the United States government.¹ The Federal Trade Commission (“FTC”) conducted a review of the antitrust implications of the transaction and, in consultation with the Department of Defense (“DOD”), approved the deal—subject to restrictions governing ULA’s relationship with other satellite manufacturers and providers of launch services—in October 2006 and, following a public comment period, entered a final consent order in May 2007.²

The transaction confronted the DOD and the FTC with difficult questions concerning the future of the US national security industrial base and the application of competition policy in the aerospace and defense (“A&D”) sector. The DOD recommended that the FTC approve the

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¹ See Press Release, ULA, Boeing, Lockheed Martin to Form Launch Services Joint Venture (May 2, 2005), <https://perma.cc/LF6T-ZW7K>.

² See Lockheed Martin Corp., F.T.C. File No. 051-0165 (Oct. 3, 2006) (proposed decision and order); Lockheed Martin Corp., F.T.C. Dkt. No. C-4188 (May 1, 2007) (final decision and order).

transaction,³ mainly on the ground that the joint venture would increase launch reliability by concentrating production and launch services in a single team rather than subdividing launch vehicle production and launch preparation activities between two separate organizations.⁴ The DOD's recommendation was the decisive factor in the FTC's review.⁵ By a vote of 5–0, the FTC cleared the transaction,⁶ though it did so with evident reluctance.⁷ The Commission observed: "In the U.S. government MTH launch services market, Boeing and Lockheed are the only competitors, and their consolidation will result in a monopoly."⁸ The agency concluded that "significant anticompetitive effects, including the loss of non-price competition and the loss of future price competition, are likely if the proposed transaction is consummated."⁹

A key consideration in the FTC's clearance decision was the prospect of future competitor entry in the market for MTH launch services for US government customers.¹⁰ In 2002, entrepreneur Elon Musk created a new company—Space Exploration Technologies ("SpaceX")—to build launch vehicles that could deliver payloads into space at dramatically lower costs than Boeing or Lockheed Martin.¹¹ When the FTC reviewed the proposed ULA venture, SpaceX had yet to carry out a successful launch of its rocket,

³ The Boeing Company, Lockheed Martin Corporation and United Launch Alliance; Analysis of Agreement Containing Consent Orders to Aid Public Comment, 71 Fed. Reg. 60,148, 60,150 (F.T.C. Oct. 12, 2006).

⁴ See Letter from Kenneth J. Krieg, Undersecretary of Def., U.S. Dep't of Def., to Deborah Platt Majoras, Chairman, FTC (Aug. 15, 2006), <https://perma.cc/WYST-T7BK>.

⁵ See Lockheed Martin Corp., F.T.C. File No. 051-0165 (May 8, 2007) (Statement of Commissioner William E. Kovacic, with whom Chairman Deborah Platt Majoras and Commissioner J. Thomas Rosch Join) [hereinafter Kovacic Statement], <https://perma.cc/S6SZ-TJY3>.

⁶ Press Release, FTC, FTC Intervenes in Formation of ULA Joint Venture by Boeing and Lockheed Martin (Oct. 3, 2006), <https://perma.cc/MZ3S-HVNW> (reporting 5–0 vote to accept consent agreement).

⁷ See, e.g., Lockheed Martin Corp., F.T.C. File No. 051-0165 (Oct. 3, 2006) (Concurring Statement of Commissioner Pamela Jones Harbour), <https://perma.cc/WC4F-938R> ("I reluctantly agree that the Commission must give DoD the benefit of the doubt. I therefore vote to accept the proposed consent agreement.").

⁸ The Boeing Company, Lockheed Martin Corporation and United Launch Alliance; Analysis of Agreement Containing Consent Orders to Aid Public Comment, 71 Fed. Reg. at 60,149.

⁹ *Id.* at 60,150.

¹⁰ See *id.*

¹¹ See Jeffrey Kluger, *SpaceX: 10 Things to Know*, TIME, <https://perma.cc/B64A-3PL5>. In 1995 Musk founded Zip2, which Compaq purchased for \$307 million in 1999. Musk invested most of the \$22 million he made from the sale of Zip2 into a start-up that became PayPal, which eBay acquired in 2002 for \$1.5 billion. Musk took \$100 million of his share of the PayPal proceeds and used it to begin SpaceX in 2002 and then spent \$70 million to create Tesla in 2003. ASHLEE VANCE, ELON MUSK: TESLA, SPACEX, AND THE QUEST FOR A FANTASTIC FUTURE 14 (2015) (examining Musk's business career extensively).

the Falcon. The Commission offered no view about the ultimate prospects of success for SpaceX, but it recited the formidable barriers that the company would face in gaining acceptance from, and contracts with, government purchasers.¹² Emphasizing that “the U.S. government only procures MTH launch services and space vehicles from firms with an established track record for success,” the Commission concluded “new entry is unlikely to reverse the anticompetitive effects of the Proposed Joint Venture.”¹³

Notwithstanding this gloomy forecast, the FTC attempted to elicit commitments from government buyers to take steps that would qualify SpaceX as a one of their suppliers. Before approving the transaction, the FTC received spoken assurances from the DOD and the National Aeronautics and Space Administration (“NASA”) that these government customers would use best efforts to facilitate new market entries—most notably, by SpaceX—to compete to supply the US government with launch services.¹⁴ These assurances were not included in the terms of the consent agreement between the FTC and ULA, nor did the correspondence between the FTC and the government buyers set out specific commitments.¹⁵ The DOD’s written statements to the FTC contained only vague aspirations for new entry,¹⁶ yet the Commissioners perceived that these spoken assurances were not perfunctory and that the DOD and NASA were aware of the difficulties they would encounter if they became irretrievably beholden to a supplier with unassailable monopoly power. The FTC board’s collective intuition was that the government purchasers would make good faith efforts to encourage entry by other firms as a way to motivate ULA.

In a statement issued the day the FTC approved the ULA joint venture, I said “[t]he ex post evaluation of the ULA settlement and other decisions involving competition policy in the defense industry will be a

¹² The Boeing Company, Lockheed Martin Corporation and United Launch Alliance; Analysis of Agreement Containing Consent Orders to Aid Public Comment, 71 Fed. Reg. at 60,149–150.

¹³ *Id.* at 60,150.

¹⁴ I base this observation on my own participation in discussions with the DOD and NASA officials who participated in the review of the ULA transaction.

¹⁵ See *infra* Section III.B (describing spoken and written interaction between the FTC and the government purchasing agencies about the possible future role of SpaceX as a supplier of MTH launch services to the DOD and NASA).

¹⁶ See Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 (“While the Atlas V and Delta IV are currently the only launch vehicles capable of meeting current requirements, the Department is open to new U.S. competitors for the launch services. The EELV acquisition strategy provides an annual opportunity for new competitors to qualify for launch services contracts by responding to the annual Notification of Contracting Action, which sets forth the details of the qualification process and is published prior to each year’s Request for Proposals.”).

useful ingredient of future discussions between the FTC and DOD.”¹⁷ This Article is an effort, nearly fifteen years later, to begin the promised assessment. This Article considers how well the assumptions that supported the approval of the ULA transaction have played out in practice. In assessing the joint venture’s impact to date, this Article focuses on the judgments that the FTC made about the parties’ efficiency argument regarding scale economies and reliability, and about the prospects for future entry by companies to compete for launch services contracts with government purchasers.

The conclusions drawn here are necessarily tentative, as the transaction’s full impact will not become evident for years to come. Nonetheless, two developments to date stand out. First, ULA thus far has met the reliability expectations that guided the analysis of the DOD and the FTC. From its first days of operation through July 30, 2020, ULA has made 140 launches without a failure.¹⁸ The venture has achieved and surpassed the reliability goals that the companies advanced in 2005–2006 as one of the key rationales for their collaboration. This is a striking achievement in a field of endeavor in which aerospace firms can never take success for granted. Building reliable launch vehicles and delivering payloads to their intended destinations in space are exceedingly hard tasks. Even a small lapse in design, assembly, or operation of the powerful, complex machines that send satellites and humans into space can have calamitous consequences.

Second, the new suppliers of launch services (SpaceX and others) have made remarkable progress toward becoming credible alternatives for NASA, national security agencies, and commercial buyers. Ashlee Vance—author of the leading biography of Elon Musk—observed that “SpaceX has become the free radical trying to upend everything about this industry.”¹⁹ Journalist Christian Davenport added, “SpaceX went from a rich man’s folly that no one took seriously to a disrupter that transformed the aerospace industry.”²⁰ It is unlikely that anyone (perhaps even Elon Musk) imagined in 2006 that by 2020 a SpaceX rocket and spacecraft would carry two American astronauts safely to and from the International Space

¹⁷ Kovacic Statement, *supra* note 5.

¹⁸ Press Release, ULA, United Launch Alliance Atlas V Successfully Launches Mars 2020 Mission for NASA (July 30, 2020), <https://perma.cc/3T3W-Z5N9>.

¹⁹ VANCE, *supra* note 11, at 217.

²⁰ Christian Davenport, *Ascendant SpaceX Plants Flag on Field Long Owned by Boeing*, WASH. POST, May 24, 2020, at G1. In another account, Davenport noted that SpaceX “has become one of the most improbable stories in the history of American enterprise, a combination of disruption, failure and triumph that has transformed it from a spunky start-up to an industry powerhouse with some 7,000 employees.” Christian Davenport, *As It Prepares to Fly Humans, SpaceX Faces the Biggest Challenge in Its History*, WASH. POST, May 17, 2020, at A1 [hereinafter Davenport, *Biggest Challenge*].

Station and restore the ability of the United States to launch humans from its own spaceports into orbit.²¹

The ULA case study serves several purposes. First, the review of the ULA venture illuminates how the DOD and the FTC resolved difficult issues involving competition, innovation, entry, and efficiency in a technologically complex and dynamic sector whose performance is essential to national security. Second, the ULA venture suggests broader lessons about how competition authorities can account for innovation related concerns in high technology markets. Third, the ULA experience underscores the importance of public procurement policy in shaping the competitive environment. The ULA case study suggests how government procurement agencies might account for competition in ways that increase the number and quality of options available to government buyers and to purchasers in commercial markets. Finally, the discussion reveals how a detailed reconstruction of individual enforcement decisions can inform assessments about the design and implementation of competition policy.

The inquiry attempted here is timely for current debates about competition law and policy. Some commentators have criticized modern antitrust enforcement for adopting a single-minded focus on the output and pricing effects of business practices and ignoring other important considerations, such as the impact of these practices on innovation and the development of new products and services.²² A suggestion in this critique is that public enforcement policy requires a dramatic reorientation that puts innovation and quality front and center in policy analysis (especially for mergers) and applies entirely new analytical tools

²¹ On May 30, 2020, a SpaceX Falcon 9 rocket launched NASA astronauts Bob Behnken and Doug Hurley into earth orbit from Cape Canaveral. The astronauts rode in a SpaceX Crew Dragon capsule and successfully docked with the International Space Station on May 31. See Irene Klotz, *NASA's New Era*, AVIATION WK. & SPACE TECH., June 15–28, 2020, at 22, 22–23. After spending sixty-two days at the ISS, Behnken and Hurley returned safely to Earth on August 2. Jacob Bogage & Christian Davenport, *NASA Astronauts Aboard SpaceX's Crew Dragon Capsule Splash Down in the Gulf of Mexico*, WASH. POST (Aug. 3, 2020, 11:33 AM), <https://perma.cc/2S6X-YG6H>. This was the first time since the discontinuation of NASA's space shuttle program in 2011, after the return of the Space Shuttle Atlantis in July of that year, that Americans had ridden into space on a launch that originated within the United States. Christian Davenport & Jacob Bogage, *SpaceX Takes Historic Flight Headed for Space Station*, WASH. POST, May 31, 2020, at A1. After NASA ended the shuttle program, the United States had to purchase seats on Russia's Soyuz spacecraft to reach the ISS. See Christian Davenport, *SpaceX Shuttle Successfully Hurls into Orbit*, WASH. POST, Mar. 3, 2019, at A3. By 2015, the cost of a seat on a Soyuz flight to the ISS was \$81.9 million. Christian Davenport, *SpaceX's Rockets Come Under Safety Experts' Glare*, WASH. POST, May 6, 2018, at A1 [hereinafter Davenport, *Safety Experts' Glare*].

²² See, e.g., William E. Kovacic, *The Chicago Obsession in the Interpretation of US Antitrust History*, 87 CHI. L. REV. 459, 460 n.3 (2020) (collecting commentary critical of a "consumer welfare" framework that ignores considerations other than output and pricing levels).

to determine how conduct and market structure affect innovation. The ULA episode reminds us that innovation is not a novel antitrust issue and that the effects of innovation have been paramount (or at least coequal with price effects) in major categories of antitrust matters—especially for aerospace and defense industry transactions. Since World War II, attaining qualitative superiority has been an overriding objective of national defense policy.²³ Federal antitrust enforcement policy has reflected the primacy of innovation as a guarantor of US supremacy in the design and production of weapon systems.²⁴ In taking this approach, antitrust agencies have embraced the view of commentators who argue that the preservation of independent centers of inventive activity should be the foremost antitrust concern in reviewing defense mergers.²⁵

²³ The importance of maintaining qualitative superiority as the chief concern of modern US weapons acquisition policy is discussed in William B. Burnett & Frederic M. Scherer, *The Weapons Industry*, in *THE STRUCTURE OF AMERICAN INDUSTRY* 289 (Walter Adams ed., 8th ed. 1990). See William E. Kovacic, *Transatlantic Turbulence: The Boeing-McDonnell Douglas Merger and International Competition Policy*, 68 *ANTITRUST L.J.* 805, 821 (2001).

²⁴ See, e.g., FTC, *JOINT STATEMENT OF THE DEPARTMENT OF JUSTICE AND THE FEDERAL TRADE COMMISSION ON PRESERVING COMPETITION IN THE DEFENSE INDUSTRY* (2016), <https://perma.cc/25BG-3SSM> (“In the defense industry, the Agencies are especially focused on ensuring that defense mergers will not adversely affect short- and long-term innovation crucial to our national security”); J. Robert Kramer II, *Antitrust Review in Banking and Defense*, 11 *GEO. MASON L. REV.* 111, 112 (2002) [hereinafter Kramer, *Antitrust Review*] (“A major goal of antitrust in the defense industry is preserving the number of innovators and innovation paths in a setting where, *ex ante*, the right innovation path is not obvious.”); J. Robert Kramer II, Chief of Litig. II Section, U.S. Dep’t of Just. Antitrust Div., *Antitrust Considerations in International Defense Mergers* (May 4, 1999).

In explaining the Justice Department decision to oppose the proposed merger of Lockheed Martin and Northrop Grumman, Antitrust Division official Constance Robinson observed:

While the [DOJ] complaint alleged significant price effects, I think it’s fair to say the principal driver of our challenge was the merger’s effect on innovation. As the Attorney General indicated when the case was filed, a loss of innovation can literally have life and death implications for our servicemen and women.

Constance K. Robinson, Dir. Operations & Merger Enf’t, U.S. Dep’t of Just. Antitrust Div., *Leap Frog and Other Forms of Innovation: Protecting the Future for High-Tech and Emerging Industries Through Merger Enforcement* (June 10, 1999). For launch vehicles and other complex systems, the benefits from competition between two or more suppliers as a source of cost savings to the DOD are highly uncertain when the number of units acquired falls below a certain level. See NAT’L DEF. BUS. INST., UNIV. OF TENN., *ECONOMIC MODELLING OF THE EFFECTS OF LOT BUYS AND COMPETITION ON GOVERNMENT EXPENDITURES FOR EELV FOR FY 2017*, at 8–10, 14–27 (2012).

²⁵ See, e.g., William E. Kovacic & Dennis E. Smallwood, *Competition Policy, Rivalries, and Defense Industry Consolidation*, 8 *J. ECON. PERSPS.* 91, 102–03 (1994) (“Competition’s greatest benefit in weapons acquisition arguably is its power to spur firms to devise ingenious approaches for fulfilling DoD’s mission requirements The main potential hazard of mergers is the danger that technological competition will diminish, and that specific technologies may become entrenched as the one or two

A second timely aspect of a review of the ULA transaction is the light it sheds on the many forms of government intervention that constitute a nation's competition policy. The prosecution of antitrust cases is but one way by which governments can help foster competition and stimulate business rivalry.²⁶ Perhaps most important, the ULA episode illustrates the power of public procurement policy—including the funding of private sector research and development and the acquisition of goods and services—to influence the course of competition.²⁷ A key part of the ULA story is how government agencies (first NASA and later the DOD) used their funding and purchasing decisions to facilitate entry into the space launch services market by SpaceX and other private firms.²⁸ Through policies that can be correctly characterized as procompetitive, the government purchasers helped catalyze new entry that transformed a sector seemingly destined to be the province of two firms or a single survivor. NASA, in particular, experimented with a new business model to inject more rivalry into the launch services sector. The ULA experience provides inspiration to ask how government procurement policy could achieve similar results in other concentrated sectors of the US economy.

This Article proceeds as follows. Part I recounts the background of ULA's creation and examines the competition policy reviews carried out by the DOD and the FTC. Part II sketches the modern framework for antitrust analysis of aerospace and defense industry mergers and describes significant analytical and policy trends. Part III reviews how the DOD and the FTC evaluated the ULA joint venture proposal and spells out the considerations that guided the FTC's decision to allow the transaction to proceed with few qualifications. Part IV recounts experience in the MTH launch services sector over the past decade, emphasizing the impact of the ULA transaction on reliability and the development of potential rivals to

remaining suppliers freeze out innovative design approaches that threaten their vested interests or defy conventional wisdom.”).

²⁶ Economists R. Shyam Khemani and Mark Dutz have developed the distinction between “antitrust” and a broader notion of “competition policy.” See R. Shyam Khemani & Mark A. Dutz, *The Instruments of Competition Policy and Their Relevance for Economic Development*, in REGULATORY POLICIES AND REFORM: A COMPARATIVE PERSPECTIVE 16 (Claudio R. Frischtak ed., 1995). Antitrust agencies have come to realize that, in executing their own mandates, it is valuable to complement a law enforcement program with the application of non-litigation tools such as advocacy before other government agencies, preparing reports, and convening public hearings. See *More Than Law Enforcement: The FTC's Many Tools—A Conversation with Tim Muris and Bob Pitofsky*, 72 ANTITRUST L.J. 773, 777–78 (2005).

²⁷ The significance of these policy tools as stimulants for competition is examined in William E. Kovacic, *Government Support for Research and Development*, in THE SHRINKING INDUSTRIAL BASE: RESTRUCTURING THE DEFENSE INDUSTRY AND ENSURING AMERICAN COMPETITIVENESS FOR THE 1990S (Ann. Meeting Program, Am. Bar Ass'n, Section of Pub. Cont. L., 1990).

²⁸ See *infra* Section IV.B.

ULA. Part V examines the policy implications of the ULA experience, including observations about the application of competition policy to mergers in high technology sectors in which innovation is a preeminent competitive concern.

Before beginning, I note two sets of professional experiences relevant to the ULA transaction and the A&D sector generally. First, in describing and interpreting the review by the DOD and the FTC of the ULA proposal, I am not a neutral observer. I was a member of the FTC from January 2006 through September 2011, and I participated in the agency's deliberations about the ULA joint venture from January 2006 until early October 2006. I voted in favor of the Commission's decision to approve the deal with conditions. Although I conclude in this Article that developments to date indicate the FTC made a sound judgment about the ULA transaction in 2006, the discussion below underscores the risks and uncertainties that surrounded the agency's assessment.²⁹ The Article identifies where I have gone beyond publicly available source materials and drawn upon my own recollection of events.

A second set of experiences outside the FTC informs my understanding of the A&D sector and how the application of antitrust and government procurement rules affect its performance. I was an associate with the Bryan Cave law firm from 1983 to 1986 and, after going to academia, served as of counsel to the firm from 1990 to 1998. With Bryan Cave, I worked on various projects for McDonnell Douglas ("MD"), though none involved the company's launch vehicle division, which Boeing acquired in 1998 when it bought MD. In the early to mid-1990s, I wrote papers for the RAND Corporation on topics related to competition in the defense industry, and I participated in a project led by Booz Allen Hamilton in 1999–2000 for the US Air Force on the future of competition in the launch vehicles sector.

Individuals who have worked in the private sector, or done consulting for organizations whose clients include public institutions (such as NASA and the US Air Force) responsible, as buyers and regulators, for engaging with private suppliers sometimes are appointed to senior leadership positions in government agencies. When this happens, there are recurring legitimate questions about the world view that such appointees bring to public service and how that world view affects their decisions as government officials. Before coming to the FTC, first as General Counsel from 2001 to 2004 and then as a member of the board from January 2006 through September 2011, I had written a number of academic papers that set out my learning from earlier professional experiences and my

²⁹ See *infra* Parts III–IV.

normative views about competition in the aerospace and defense sector.³⁰ Collectively, these papers provide a comprehensive view of the policy preferences that guided my thinking about the ULA transaction in 2006.

I. Formation of the United Launch Alliance Joint Venture

In May of 2005, following extensive consultations with the DOD and other government customers, Boeing and Lockheed Martin (“LM”) announced plans to form the United Launch Alliance joint venture.³¹ The companies planned to combine engineering and administrative functions near LM’s offices in Denver and to consolidate design and production work at Boeing’s facility in Decatur, Alabama.³² The firms also would unify their launch site operations staffs at Cape Canaveral and Vandenberg Air Force Base.³³ ULA would sustain production of the firms’ families of launch vehicles (Delta for Boeing and Atlas for Lockheed Martin), but the production work would be performed by a team that integrated personnel from the two companies.³⁴

The parties advanced two principal rationales for the transaction. First, the consolidation would yield hundreds of millions of dollars in cost savings through the elimination of personnel redundancies and superior

³⁰ See, e.g., William E. Kovacic, *Blue Ribbon Defense Commissions: The Acquisition of Major Weapon Systems*, in ARMS, POLITICS, AND THE ECONOMY: HISTORICAL AND CONTEMPORARY PERSPECTIVES 61 (Robert Higgs, ed. 1990); William E. Kovacic, *Competition Policy Analysis of Joint Ventures and Teaming Arrangements by Government Agencies and the Courts*, in SUBCONTRACTING, TEAMING AND PARTNERING IN THE AGE OF CONSOLIDATION AND COOPERATION (Am. Bar Ass’n, Section of Pub. Cont. L., 1997); Kovacic, *supra* note 27; William E. Kovacic, *The Sorcerer’s Apprentice: Public Regulation of the Weapons Acquisition Process*, in ARMS, POLITICS, AND THE ECONOMY: HISTORICAL AND CONTEMPORARY PERSPECTIVES 104 (Robert Higgs ed., 1990); William E. Kovacic, *Toward the Development of a Unified Trans-Atlantic Defense Procurement Market*, in ANNUAL PROCEEDINGS OF THE FORDHAM COMPETITION LAW INSTITUTE 179 (Barry E. Hawk ed., 2007); William B. Burnett & William E. Kovacic, *Reform of United States Weapons Acquisition Policy: Competition, Teaming Arrangements, and Dual-Sourcing*, 6 YALE J. ON REG. 249 (1989); William E. Kovacic, *Antitrust Analysis of Joint Ventures and Teaming Arrangements Involving Government Contractors*, 58 ANTITRUST L.J. 1059 (1990); William E. Kovacic, *Commitment in Regulation: Defense Contracting and Extensions to Price Caps*, 21 PUB. CONTRACT L.J. 453 (1991) [hereinafter Kovacic, *Commitment in Regulation*]; William E. Kovacic, *Competition in the Postconsolidation Defense Industry*, 44 ANTITRUST BULL. 421 (1999) [hereinafter Kovacic, *Postconsolidation Defense Industry*]; William E. Kovacic, *Illegal Agreements with Competitors*, 57 ANTITRUST L.J. 517 (1988); William E. Kovacic, *Merger Policy in a Declining Defense Industry*, 36 ANTITRUST BULL. 543 (1991); William E. Kovacic, *Regulatory Controls as Barriers to Entry in Government Procurement*, 25 POL’Y SCIS. 29 (1992); Kovacic, *supra* note 23; Kovacic & Smallwood, *supra* note 25.

³¹ See Press Release, ULA, *supra* note 1.

³² *Id.*

³³ *Id.*

³⁴ *Id.*

operational integration.³⁵ These savings, in turn, would reduce the price that government purchasers paid for launch services.

The second and more important justification involved scale economies.³⁶ Falling demand for launch services for national security purposes and commercial applications had reduced production rates (referred to in the industry as “tempo”³⁷) for both firms.³⁸ Over time, a smaller number of launches was being subdivided between the two organizations.³⁹ As a result, neither Boeing nor Lockheed Martin could realize the learning benefits that come from more extensive experience. Diminished experience reduced the proficiency of each team and increased the risk of launch failures, which could deny the DOD needed access to critical communications and reconnaissance satellites.⁴⁰

The companies stated that the combination of all experience in a single, integrated team would raise capability and improve performance above levels that prevailed when Boeing and Lockheed Martin maintained independent design and production teams. When the ULA venture was announced, Boeing’s Chief Executive Officer, James A. Bell, explained: “By joining together, we are convinced that we can provide the customer with assured access to space at the lowest possible cost while ensuring enhanced reliability by eliminating duplicate infrastructure and bringing experts from both companies to focus on mission assurance.”⁴¹ Daniel Collins, a Boeing executive appointed to be the new ULA chief operating officer, added: “The continued performance of Boeing and Lockheed Martin employees as a new team going forward—from the engineering center to the factory floor to the launch pad—will offer even greater reliability and mission assurance to the customer.”⁴²

³⁵ The press release announcing formation of the venture said: “Based upon initial estimates, annual savings to the government resulting from the combination are expected to be approximately \$100-150 million.” *Id.*

³⁶ As stated in one classic account, scale economies “result when the increased size of a single operating unit producing or distributing a single product reduces the unit cost of production or distribution.” ALFRED D. CHANDLER, JR., *SCALE AND SCOPE: THE DYNAMICS OF INDUSTRIAL CAPITALISM* 17 (1990).

³⁷ See Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 (defining “launch tempo” as “the number of booster cores built in the assembly line and launched per year”).

³⁸ See The Boeing Company, Lockheed Martin Corporation and United Launch Alliance; Analysis of Agreement Containing Consent Orders to Aid Public Comment, 71 Fed. Reg. at 60,150 (reviewing concerns about falling levels of launches and the distribution of a declining amount of work across two workforces).

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ Press Release, ULA, *supra* note 1.

⁴² *Id.*

The companies did not directly address the possibility that the unification of MTH launch services capability in a single enterprise might not serve the government's best interests over time. The companies hinted that concerns about pricing for future launches would be alleviated through the continued application of the government's systems for monitoring costs and that, in any event, the gains from consolidation were compelling.⁴³ At the time ULA was announced, Lockheed Martin's Chief Executive Officer, Robert J. Stevens, said "It has become increasingly clear that an alliance of launch capabilities is essential to meet the space communications, surveillance and reconnaissance needs of the 21st century, and to assure access to space."⁴⁴ Stevens added that the ULA joint venture "will permit our national customers to achieve their mission objectives while reflecting current budget pressures and providing the government with full cost visibility."⁴⁵

In 2005, students of the companies had reason to doubt the sanguine assessment of the Boeing and LM executives about how the new venture would achieve a synthesis of capability that surpassed what the firms could achieve acting independently. For several years before the ULA venture was announced, Boeing and LM had engaged in bitter litigation involving competition to provide launch services to the DOD. Lockheed Martin had sued Boeing for alleged misconduct by competing for awards in the Air Force Extended Expendable Launch Vehicle Program ("EELV") and accused Boeing of violations of the Racketeer Influenced and Corrupt Organizations Act, the Florida Civil Remedies for Criminal Activities Act, the Sherman Act, and the Florida Antitrust Act.⁴⁶ In the same case, Boeing filed a counterclaim alleging that LM had engaged in unfair competition and tortious interference with contractual relations and had violated the Lanham Act and the Florida Unfair Deceptive and Trade Practices Act.⁴⁷ The agreement to create ULA stipulated that, upon the closing of the transaction, the companies would seek an order to suspend their litigation in federal district court concerning the Air Force EELV program.⁴⁸

⁴³ *See id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *See Lockheed Martin Corp. v. Boeing Co.*, 314 F. Supp. 2d 1198, 1199 (M.D. Fla. 2004).

⁴⁷ *Lockheed Martin Corp. v. Boeing Co.*, No. 6:03-cv-796-Orl-28KRS 2005, U.S. Dist. LEXIS 15365, at *3-4 (M.D. Fla. Mar. 21, 2005).

⁴⁸ Press Release, ULA, *supra* note 1. Regarding the pending litigation between the two companies, LM Chief Executive Officer, Robert J. Stevens, said:

The mission of this joint venture is to reliably meet critical launch needs, so it is imperative that the two teams come together as one with all lingering issues resolved . . . When agreement was reached to form this alliance, both parties agreed that they

II. The Process and Substance of Antitrust Analysis of Defense Industry Mergers: Modern Trends

The review of mergers of defense contractors involves contributions from the US antitrust agencies (the DOJ and the FTC) and the government purchasing agencies (e.g., the DOD). The DOJ and the FTC assess the compatibility of transactions with the federal antitrust laws. The defense purchasing authorities provide their views to the antitrust agencies and determine whether the transaction satisfies government procurement requirements governing matters such as the assignability of government contracts. As described below, the government buyers do not control the antitrust analysis, but their views carry considerable weight in decisions by the DOJ or the FTC to attempt to block a merger, accept a settlement, or clear a transaction without conditions.

A. Antitrust Review Process

The principal mechanism for federal antitrust scrutiny of mergers and joint ventures is section 7 of the Clayton Act,⁴⁹ which forbids consolidations whose effect “may be substantially to lessen competition.”⁵⁰ Proposed transactions above certain size thresholds must be notified in advance to the federal antitrust agencies.⁵¹ The federal antitrust agencies have a protocol that determines which agency will review the matter. Allocations made under the interagency “clearance” procedure are based on the relative levels of expertise of each agency regarding the products and firms in question.

Once the parties have notified the transaction, the federal antitrust agency ordinarily has thirty days to decide whether to request additional information. Pending the parties’ compliance with this “second request,” the transaction may not be completed.⁵² Once the parties have complied with the second request, the antitrust agency ordinarily has thirty days to decide whether to seek an injunction in federal court to block the transaction or to accept a settlement to resolve potential competitive

were ready to move forward with a clean slate and an undistracted focus on mission success.

Id.

⁴⁹ See 15 U.S.C. § 18.

⁵⁰ *Id.* See ANDREW I. GAVIL, WILLIAM E. KOVACIC, JONATHAN B. BAKER & JOSHUA D. WRIGHT, ANTITRUST LAW IN PERSPECTIVE: CASES, CONCEPTS AND PROBLEMS IN COMPETITION POLICY 672–74 (3d ed. 2017) (describing the antitrust legal framework for merger control in the United States).

⁵¹ *Id.* at 722–26.

⁵² *Id.* at 723–24.

problems.⁵³ If the agency takes no action within the thirty-day period, the parties can consummate the transaction. The deadlines set in this framework can be (and sometimes are) extended by agreement between the agency and the parties.⁵⁴ If the DOJ or the FTC desire to block a proposed merger, the moving agency must seek an injunction in federal district court. Neither agency has the power acting on its own to prohibit a transaction.⁵⁵

In cases involving defense industry mergers, the question of whether and how officials from the government purchasing agency will testify, and whether they will endorse or oppose the merger, are crucial factors in determining how the antitrust agencies will proceed.⁵⁶ Since the mid-1980s until 2005 (when Boeing and Lockheed notified their agreement to the US antitrust agencies), the DOJ and the FTC have reviewed numerous proposed mergers involving firms in the aerospace and defense industry.⁵⁷ Between them, the two federal antitrust agencies have examined a number of transactions involving either Boeing or Lockheed Martin. The FTC cleared Boeing's purchase of McDonnell Douglas and permitted Boeing to acquire the satellite division of Hughes, subject to conditions.⁵⁸ The DOJ accepted settlements that permitted Lockheed to merge with Marietta and acquire the combat aircraft operations of General Dynamics.⁵⁹ In the late 1990s, the DOJ sued to block Lockheed Martin from purchasing Northrop Grumman, causing the parties to abandon the merger.⁶⁰

By the time the ULA joint venture was announced in 2005, several trends had emerged in antitrust reviews by the DOJ, the FTC, and the federal courts. The federal agencies generally had challenged transactions that threatened to reduce (from two to one) the number of suppliers for weapon systems or inputs to those systems. The agencies had opposed such "mergers to monopoly" in matters involving tank ammunition (Olin and Alliant),⁶¹ image intensifier tubes used in making night vision devices

⁵³ *Id.*

⁵⁴ 1 AM. BAR ASS'N, ANTITRUST LAW DEVELOPMENTS 411-12 (8th ed. 2017).

⁵⁵ *Id.* at 422-23.

⁵⁶ Kramer, *Antitrust Review*, *supra* note 24, at 111 ("The DOD is, of course, for the antitrust agencies the critical witness in any enforcement action; a status that stems from its role as sole buyer of many products."); *see also* Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 430-32, 470-75.

⁵⁷ The most intensive period of activity took place in the 1990s. *See* Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 422-23, 422 tbl.

⁵⁸ *Id.*; Kovacic, *supra* note 23, at 817 tbl.4.

⁵⁹ Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 422-23, 471.

⁶⁰ *Id.* at 468-75.

⁶¹ *FTC v. Alliant Techsystems Inc.*, 808 F. Supp. 9, 13, 23 (D.D.C. 1992).

(Imo and Optic Electronics),⁶² submarine design and construction (General Dynamics and Newport News Shipbuilding),⁶³ and defense electronics systems (Lockheed Martin and Northrop Grumman).⁶⁴ Few cases had been litigated to a resolution on the merits, and in each of these decisions the district court had enjoined the merger (e.g., Olin and Alliant).

The aversion of the antitrust agencies towards these two-to-one defense industry mergers was not absolute. In a few cases, the antitrust authorities had approved mergers to monopoly. Raytheon was permitted to purchase the tactical missiles division of Hughes without conditions, and the FTC's unconditional clearance of Boeing's acquisition of McDonnell Douglas combined the only two US suppliers of aerial refueling tankers.⁶⁵ More recently, in 2013, the FTC approved a merger to monopoly between Gencorp's Aerojet division and Pratt & Whitney's Rocketdyne division.⁶⁶ These rare approvals have rested heavily on recommendations from the DOD regarding the likely volume of future purchases of the system in question and the costs associated with sustaining two independent design and production teams.

B. *The Role of the Government Purchaser*

Olin's unsuccessful attempt in 1992 to purchase the tank ammunition operations of Alliant spurred important changes in the role of the government purchasers and their cooperation with the DOJ and the FTC in merger reviews. Faced with a two-to-one merger, the FTC sued in federal court to block the tank ammunition deal.⁶⁷ The merging parties defended the merger on the ground that the transaction was the only suitable way to ensure that key capabilities were preserved amid declining production volumes that made a down select to one firm inevitable.⁶⁸

⁶² FTC v. Imo Indus., Inc., 1989 U.S. Dist. LEXIS 14050 (D.D.C. Nov. 22, 1989). See Janet Steiger, Chairman, FTC, Prepared Remarks at the American Bar Association Section of Antitrust Law Spring Meeting: Report from Official Washington (Apr. 12, 1991).

⁶³ Press Release, U.S. Dep't of Just., Justice Department Files Suit to Block General Dynamics' Purchase of Newport News Shipbuilding (Oct. 23, 2001), <https://perma.cc/G5A2-C4YC>.

⁶⁴ Complaint at 1–2, United States v. Lockheed Martin Corp., No. 1:98VC00731 (D.D.C. Mar. 23, 1998) (challenging proposed acquisition by Lockheed Martin of Northrop Grumman).

⁶⁵ William E. Kovacic, *The Modern Evolution of U.S. Competition Policy Enforcement Norms*, 71 ANTITRUST L.J. 377, 444–47 (2003).

⁶⁶ Spaceflight Now, *Two Engine Rivals Merge into Aerojet Rocketdyne* (June 18, 2013), <https://perma.cc/QQM2-YEB2>.

⁶⁷ See FTC v. Alliant Techsystems Inc., 808 F. Supp. 9, 13 (D.D.C. 1992).

⁶⁸ See Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 430–32.

Some constituencies within the Department of the Army agreed with the parties and favored the transaction. At the trial, the merging parties called a senior Army official to appear as a witness.⁶⁹ Against a backdrop of active discussions between the DOD and the FTC, the DOD front office instructed the Army official to give testimony that was faintly and ambiguously supportive to Olin and Alliant. Under examination by the trial judge, the Army official reported that he was permitted to say only that the Army “has no objection to the proposed merger” and “take[s] no official position concerning the antitrust implications of the transaction.”⁷⁰ When pressed by the judge to offer a view about whether the DOD affirmatively supported the merger, the Army official demurred. Hearing no positive backing for the deal from the DOD, the judge sustained the FTC’s request for an injunction.⁷¹ Had the DOD, in giving its professional opinion about the transaction’s impact on national security, testified squarely in favor of the deal, one suspects that the judge would not have enjoined the merger.

The near collision between the DOD and the FTC in the courtroom in the Olin and Alliant merger inspired the creation of a Defense Science Board (“DSB”) advisory panel which recommended, among other steps, closer coordination between the antitrust agencies and the DOD involving proposed defense mergers.⁷² The DOD created a liaison office to work with the antitrust authorities to gather information and to present a coherent statement of the DOD’s opinion about specific transactions.⁷³ In organizational terms, DOD is not a single-minded institution—it embodies a large collection of subsidiary bodies. Within such a complex institution, it is unsurprising that there might be varied (and contested) views about the merits of a proposed merger. The liaison process reforms were designed to assist the Department in formulating a single institutional recommendation and to communicate its opinion to the antitrust agencies. The liaison process also provided a useful means for the DOJ and the FTC to explain their own decision-making methodology and to identify factors that mattered the most.

The operation of the enhanced liaison mechanism improved communications between the antitrust agencies and the government purchasers, especially by engaging the two groups in data collection and substantive discussions early in the life cycle of the transaction. The

⁶⁹ See *id.* at 431.

⁷⁰ *Alliant Techsystems Inc.*, 808 F. Supp at 17.

⁷¹ See *id.* at 16–17, 23–24.

⁷² DEF. SCI. BD., OFFICE OF THE UNDERSECRETARY OF DEF. FOR ACQUISITION & TECH., ANTITRUST ASPECTS OF DEFENSE INDUSTRY CONSOLIDATION I, 4 (1994).

⁷³ See Kramer, *Antitrust Review*, *supra* note 24, at 114.

results were evident in the DOJ's successful efforts to block Lockheed Martin's attempted acquisition of Northrop Grumman and General Dynamics's purchase of Newport News Shipbuilding's submarine design and production operations. It was apparent that, in both cases, there was some disagreement among groups within the DOD about the merits of these deals. Yet, in both cases, the DOD announced that it supported the DOJ's assessment of the transactions and would testify against the mergers in court.⁷⁴

As suggested above, the views of the DOD ordinarily are decisive in antitrust reviews by the DOJ and the FTC.⁷⁵ Neither agency desires to appear in a courtroom where the DOD will testify on behalf of the merging parties and support the transaction. The agencies understand that the DOD's views about what best serves the nation's security interests likely will be persuasive to the federal judge. At least in general terms, the antitrust agencies can have confidence that the DOD is sympathetic to their concerns about the potential adverse effects of consolidation among its suppliers. The DOD ordinarily will be aware of the benefits of competition in depressing prices and providing a larger range of design and product choices.⁷⁶ At times in the past decade, DOD officials have expressed concerns that consolidation has reduced the number of suppliers for specific weapon systems to such an extent that the surviving incumbents possess substantial market power and wield it in ways that undermine the national interest.⁷⁷

The DOD is aware of the hazards it may face when it is required to rely upon a single supplier. Sometimes, however, the Department may decide that other policy considerations are more important. These considerations can include ensuring the preservation of certain industrial

⁷⁴ See Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 469–75.

⁷⁵ *Id.* at 469.

⁷⁶ See Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 (“Because the interests of the Department of Defense are usually best served by maintaining competitive markets for required products and services, it is our policy to oppose business combinations that severely reduce or eliminate competition or that may create unhealthy or unfair competition in those products or services.”).

⁷⁷ See GREGORY SANDERS & ZACH HUITINK, CTR. FOR STRATEGIC & INT’L STUD., *EVALUATING CONSOLIDATION AND THE THREAT OF MONOPOLIES WITHIN INDUSTRIAL SECTORS 4–6* (2019) (reporting concerns of DOD acquisition officials about excessive concentration in the defense supplier base); see also HON. FRANK KENDALL, *Kendall Statement on Consolidation in the Defense Industry*, September 30, 2015, in *GETTING DEFENSE ACQUISITION RIGHT 96* (2017) (“With size comes power, and the Department’s experience with large defense contractors is that they are not hesitant to use this power for corporate advantage.”); Jeffrey Bialos, *Some Thoughts on DOD’s New Merger Guidance*, LAW 360 (Oct. 19, 2015, 4:47 PM), <https://perma.cc/G8W7-U8X2> (describing new DOD guidance that states the DOD’s skepticism toward mergers of leading defense firms and expressing concerns about adverse effects of future acquisitions on innovation and price).

assets (which may be retained with greater certainty through a merger than through a winner-take-all competition) and reducing the fixed costs associated with maintaining two or more centers of design and production capability.⁷⁸

The Aerojet and Rocketdyne merger, mentioned above, underscores the crucial part that the DOD's views play in the antitrust review process. The FTC concluded that the proposed merger would give Aerojet a monopoly over certain control systems and would increase the price of and reduce innovation to develop these systems. Consultation with the DOD led the Commission to stand down—the agency said it would not challenge the transaction in light of the DOD's support for the merger. In its closing letter, the FTC explained that “[i]t has been and continues to be the Commission's practice to defer to the Department of Defense's assessment of [the non-economic] benefits and to accord that assessment significant weight in exercising the Commission's prosecutorial discretion.”⁷⁹

The DOD's role as a monopsonist buyer for many defense-related systems means that, in some cases (such as the Aerojet and Rocketdyne merger), the antitrust authorities must use advocacy and persuasion before the government purchasing officials rather than the threat of litigation as the main tools for advancing their competition policy preferences. The DOJ and the FTC must convince the buyer to weigh competition concerns and account for them in the decision about whether to give the DOD's support to a proposed deal.

Since the mid- to late-1980s, federal antitrust agencies have accumulated extensive experience with joint ventures and mergers involving defense companies. These reviews created substantial agency expertise in the defense sector and deep awareness of the institutional setting in which government purchasing agencies acquire goods and services from private suppliers. Moreover, the antitrust reviews gave paramount importance to innovation as a foremost concern in merger reviews and developed methodologies to assess the likely impact of transactions on the ability and incentive of firms to achieve qualitative improvements over time.

In a number of A&D transactions, the antitrust agencies have devoted significant attention to vertical issues as well as to horizontal overlaps. In *Northrop Grumman Corp.*,⁸⁰ Northrop Grumman acquired Orbital ATK, a defense technologies services company which is the principal US supplier

⁷⁸ See Kovacic & Smallwood, *supra* note 25, at 106–08.

⁷⁹ Letter from Michael R. Moiseyev, Assistant Dir., Bureau of Competition, to Susan P. Raps, Deputy Gen. Couns. of Acquisition & Logistics, U.S. Dep't of Def. 3 (June 6, 2013) (on file with the FTC).

⁸⁰ F.T.C. File No. 181-0005 (Dec. 3, 2018) (decision).

of solid rocket motors.⁸¹ Among other goals, Northrop Grumman made the acquisition to bolster its own position as a provider of space vehicles. One focus of the FTC's inquiry was the possibility that the merged entity might deny or impede the access of Northrop Grumman's rivals to Orbital's solid rocket boosters. To allay the Commission's concerns, Northrop Grumman agreed to create a firewall between the newly acquired solid rocket motor unit and the rest of its business, and to sell rocket motors to its competitors on a nondiscriminatory basis.⁸² The consent agreement allows the DOD to appoint a compliance officer to oversee fulfillment of the order's terms.⁸³

III. The Government's Review of the ULA Joint Venture

When the ULA joint venture was notified to the federal agencies, the FTC received clearance to conduct the antitrust review based on its larger experience in studying the launch vehicle sector. Over the course of its investigation in 2005, the FTC decided that the transaction was a merger to monopoly for mid- to heavy-lift national security launches.⁸⁴ The combination of these assets in a single supplier created a strong presumption that the merger would have serious anticompetitive effects by raising the prices that government purchasers would pay over time for launches and by depressing incentives for Boeing and Lockheed Martin to innovate in advancing the state of the art for launch vehicles.⁸⁵ Had that

⁸¹ Dave Simpson, *FTC Clears Northrop's \$9.2B Orbital Buy with Remedies*, LAW 360 (June 5, 2018, 9:48 PM), <https://perma.cc/5G7E-3259>.

⁸² Press Release, FTC, *FTC Approves Modified Final Order Imposing Conditions on Northrop Grumman's Acquisition of Solid Rocket Motor Supplier Orbital ATK, Inc.* (Dec. 8, 2018), <https://perma.cc/S9TQ-Y8YZ>.

⁸³ *Id.*

⁸⁴ In its investigation of the ULA joint venture, the Commission unwisely departed from good agency practice in one respect. After the proposed transaction was notified, the FTC issued a second request. The ULA partners did not follow the ordinary process of providing the requested materials and certifying compliance. The FTC did not insist that the parties satisfy these requirements—perhaps because the parties provided some of the requested items and the agency believed it had sufficient information, based on these and other materials, to take a decision. It is also possible, however, that full compliance with the second request might have given the Commission a stronger basis to assess the parties' efficiency arguments and other aspects of the transaction. The FTC's failure to demand compliance with the second request was an unfortunate lapse.

⁸⁵ A few years earlier, Lockheed Martin seems to have acknowledged what can happen when the government faces a monopolist. In June 2003, Lockheed Martin filed a civil antitrust monopolization suit against Boeing, arguing that Boeing had monopolized a market consisting of "medium, intermediate, and heavy-lift launch services for [the] U.S. Government." Complaint at 88–89, *Lockheed Martin Corp. v. Boeing Co.*, 390 F. Supp. 2d 1073 (M.D. Fla. 2005). Lockheed Martin further

been the end of the analysis, the staff would have emphatically recommended that the Commission block the transaction, and the FTC's board would likely have agreed.

The DOD had a different view. By early 2006, the Department informed the FTC that it supported the venture to improve reliability. The DOD acknowledged the FTC's concerns about the competitive dangers posed by the joint venture⁸⁶ but concluded that the superior reliability promised by the transaction warranted accepting these risks.⁸⁷ As noted earlier, the declining number of launches had reduced the amount of work available for both the Boeing and Lockheed Martin teams.⁸⁸ This posed a serious possibility that the proficiency of each team would suffer, and the rate of launch failures would subsequently increase.⁸⁹ To the DOD, the joint venture would concentrate design, production, and launch experience in a single integrated team and thereby sustain high levels of proficiency.⁹⁰ The same result would apply to the launch site preparation operations of the two companies—greater proficiency would generate higher launch reliability.⁹¹ For the DOD, this was the primary consideration and warranted acceptance of a plan that would reduce the number of industry participants to one. Similarly, NASA also consulted with the FTC on the transaction and informed the Commission that “the

alleged that Boeing's position enabled it to exercise market power to the government's detriment. *Id.* at 1081–82.

⁸⁶ See Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 (“Indeed, we have reviewed the Federal Trade Commission staff's analysis of the proposed transaction's likely effects, and acknowledge that the most negative view of the creation of ULA is that it will almost certainly have an adverse effect on competition, including higher prices over the long term, as well as a diminution in innovation and responsiveness.”).

⁸⁷ See *id.* (“The transaction does . . . present very unique national security benefits that in the Department's analysis clearly outweigh the loss of competition, even in the most extreme view of that loss.”).

⁸⁸ See *id.* (“The current and future commercial launch market, including the inability of U.S. firms to compete against foreign firms coupled with the low number of national security launches, makes it extremely difficult for two competing U.S. providers to maintain separate, competing, experienced workforces.”).

⁸⁹ See *id.* (attach. on Background Information on National Security Space for ULA) (“Historical data (1973 – 2003) for both Delta II and Atlas II launches demonstrate that the statistical likelihood for launch failure is reduced as launch rate increases. At current launch rates for the Delta IV and Atlas V systems, the launch rate for each team is in the zone where the failure rate is statistically unacceptable.”).

⁹⁰ See *id.* (“The single ULA workforce will benefit from a launch tempo, defined as the number of booster cores built in the assembly line and launched per year, that would be greater than could be expected for either of [the] two competing workforces.”).

⁹¹ See *id.* (“[C]ombining launch teams at both coast launch sites will provide the experience critical to launch success.”).

cognizant mission directorates” with the space agency “neither support nor oppose the joint venture.”⁹²

A. *Resolution of the Pivotal Competition Issues: Efficiency and Entry*

The FTC regarded the scale economy, quality, and reliability arguments to be genuine and significant.⁹³ There was considerable evidence (from prior production of launch vehicles and other defense systems) that subdividing a relatively small and declining amount of work between two teams denied both teams the experience base needed to be successful.⁹⁴ The agency realized that raising the reliability rate for launches from, say, ninety-five percent to ninety-eight percent, could yield substantial national security benefits. And the agency was aware that in past transactions (e.g., the Raytheon and Hughes merger), when faced with a strong efficiency justification and a recommendation to clear from the DOD, the FTC had permitted a two-to-one merger. Yet there was also the awareness (based on hundreds of past antitrust reviews), that a single supplier does not feel the same urgency to perform well over time as does a firm that has one credible competitor.

Boeing and Lockheed Martin also had argued that the joint venture would generate substantial cost savings (approximately \$150 million per

⁹² Letter from Michael C. Wholley, Gen. Counsel, NASA, to Randall Long, FTC Re: United Launch Alliance (Dec. 16, 2005).

⁹³ See Kovacic Statement, *supra* note 5, at 1 (“In reviewing defense industry mergers, competition authorities and the DOD generally should apply a presumption that favors the maintenance of at least two suppliers for every weapon system or subsystem. The decisive factor that overrides this presumption and supports the settlement approved today is the cost of subdividing a small number of launches in the face of a national policy that mandates the maintenance of two families of launch vehicles . . . The compelling justification for permitting the ULA transaction to proceed, subject to conditions, is its capacity to improve quality in the performance of design, production, and launch preparation tasks in a discipline in which operational reliability is a paramount objective.” (citation omitted)).

⁹⁴ See THE CONGRESSIONALLY MANDATED NAT’L SEC. SPACE LAUNCH REQUIREMENTS PANEL, RAND NAT’L DEF. RSCH. INST., NATIONAL SECURITY SPACE LAUNCH REPORT xvi (2006) [hereinafter SPACE LAUNCH REPORT] (“[G]iven that the U.S. government is the only likely customer, the probability that launch demand may drop below a demand that will sustain team proficiency for two families is increased, giving rise to questions of reliability that often stem from low production rates.”); JEFFREY A. DREZNER, GILES K. SMITH, LUCILLE E. HORGAN, CURT ROGERS & RACHEL SCHMIDT, RAND, MAINTAINING FUTURE MILITARY AIRCRAFT DESIGN CAPABILITY 46–51 (1992); Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 429; Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 (attach. on Background Information on National Security Space for ULA) (“Fifty years of launch experience has demonstrated that increased launch tempo will reduce risk and increase space launch mission success rates.”). The benefits from cumulative experience can diminish when a program nears its end, and the producer shifts its best personnel to newer projects. I am grateful to Henry Hertzfeld for this point.

year after an initial three-year transition period) by eliminating the need to maintain multiple production facilities. Neither the FTC nor the DOD regarded the cost saving arguments to be persuasive.⁹⁵

During deliberations over the transaction within the DOD and the FTC, SpaceX's chairman Elon Musk made appearances before both agencies.⁹⁶ In his conversations at the FTC, Musk did not ask the FTC to block the ULA transaction but instead insisted upon the adoption of conditions that would enable SpaceX to obtain government contracts that would allow the entrant to build the capability necessary to provide launch services to government. Musk emphasized that SpaceX was developing a business model which, if successful, would greatly reduce the cost of sending payloads into space.⁹⁷ SpaceX had made substantial investments in developing its Falcon series rocket design, but (at that point) had yet to carry out a successful launch.⁹⁸

In most antitrust reviews, the FTC would not have regarded the possibility of subsequent entry and expansion by a market entrant like SpaceX as a basis for approving the merger. There were many reasons to

⁹⁵ See Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 ("Although the parties assert that the joint venture would generate significant savings for the Department of Defense, our careful review of those savings leads us to conclude that the cost savings, while attractive, are not adequate to support the loss of competition."). A contemporaneous report prepared by one of the country's federally funded research and development centers had found that the DOD required substantially more data about the costs of Boeing and LM before relying on cost savings as a basis for combining, through ULA, the Atlas and Delta families of launch vehicles or performing a down select to choose a single supplier. See SPACE LAUNCH REPORT, *supra* note 94, at xviii; see also Andrea Shalal-Esa, *Report Raises Questions About Rocket Alliance* (Aug. 16, 2006, 3:58 PM), <https://perma.cc/P6U5-ZQ58> (describing study prepared for DOD by RAND).

⁹⁶ Musk and his legal advisors met with each of the FTC's members, including me.

⁹⁷ In his biography of Musk, Ashlee Vance describes Musk's vision for SpaceX:

SpaceX was to be America's attempt at a clean slate in the rocket business, a modernized reset. Musk felt that the space industry had not really evolved in about fifty years. The aerospace companies had little competition and tended to make supremely expensive products that achieved maximum performance. They were building a Ferrari for every launch, when it was possible that a Honda Accord might do the trick. Musk, by contrast, would apply some of the start-up techniques he'd learned in Silicon Valley to run SpaceX lean and fast and capitalize on the huge advances in computing power and materials that had taken place over the past couple of decades. As a private company, SpaceX would also avoid the waste and cost overruns associated with government contractors.

VANCE, *supra* note 11, at 114. This was the message that Musk conveyed to me during his visit to the FTC in connection with the ULA transaction.

⁹⁸ SpaceX would not accomplish a successful launch of its Falcon rocket into earth orbit until September 2008. *Id.* at 202-03.

discount the company's prospects for success.⁹⁹ SpaceX had yet to demonstrate that its concept would work in practice—as noted above, it had yet to carry out a successful test of its Falcon rocket.¹⁰⁰ Even if the company's early, lighter version of the Falcon succeeded, it would be a long and laborious process to gain confidence in the eyes of government purchasers—especially the national security customers for launch services—and to qualify to carry sensitive national security payloads into space. For decades, government buyers awarding contracts for complex aerospace and defense systems had placed great emphasis on the demonstrated capacity of a supplier to carry out difficult design and production tasks.¹⁰¹ One could reasonably ask how an untested entrant could overcome the predisposition of government buyers to deal only with familiar enterprises with proven track records. Ease of entry can overcome competition concerns about a highly concentrative merger, but the SpaceX entry story seemed a long distance—perhaps a prohibitive distance—away from accomplishment.

B. *The FTC's Decision Not to Seek to Block the Venture*

Given the DOD's support for the merger, the FTC's options were severely constrained. Suing to block the transaction without the DOD's support seemed to be a formula for failure.¹⁰² To succeed, the agency would have to seek to impeach the DOD by attacking the technical details of its analysis, questioning the soundness of its professional judgment, or casting doubt about its motives—perhaps suggesting that the Department had been captured by its powerful, legendary suppliers (Boeing and Lockheed Martin) and blinded to the possibilities that an unconventional

⁹⁹ See Davenport, *Biggest Challenge*, *supra* note 20, at A1 (“The company was never supposed to succeed. Even its founder gave it odds few gamblers would take - 1 in 10. But Elon Musk decided to go all in anyway, investing some \$100 million of his own money, over the protests of his friends, family and the basic logic that said a private entrepreneur with no experience in spaceflight shouldn't start a rocket company.”). After astronauts Behnken and Hurley landed in the Gulf of Mexico on August 2, Musk said the success of SpaceX was unforeseeable when he founded the company in 2002: “I thought we had maybe - when starting SpaceX - . . . a 10% chance of reaching orbit. So to those who doubted us I was like, ‘Well, I think you're probably right.’” Dave Mosher & Morgan McFall-Johnsen, *SpaceX Just Brought 2 NASA Astronauts Back to Earth in Its Crew Dragon Spaceship, Kicking Off “The Next Era in Human Spaceflight,”* BUS. INSIDER (Aug. 2, 2020), <https://perma.cc/RE6J-X5PF>.

¹⁰⁰ In the early to mid-2000s, Musk's goal of achieving regular, low-cost access to earth orbit seemed unattainable. See VANCE, *supra* note 11, at 116 (“As good as a cheap launch vehicle sounded, the odds of a private citizen building one that worked were beyond remote.”).

¹⁰¹ See Kovacic & Smallwood, *supra* note 25, at 106–07 (discussing importance to government purchasers of the contractor's track record in previous programs).

¹⁰² This was my perception as a member of the Commission, and a majority of my colleagues shared the view.

entrant could bring to the field. It appeared unlikely that, given the choice between the DOD's and the FTC's disparate views on national security interests, a federal judge would embrace the FTC's position.¹⁰³

Even if the FTC had prevailed in litigation and obtained a judicial order blocking ULA's formation, the DOD had the ability to foster the creation of a ULA equivalent if it desired to consolidate all development and production work for heavy launch vehicles in a single firm. The DOD could have initiated a down select in which it announced its intention to cease allocating contract funds to two firms (Boeing and LM) and to issue future contract awards to a single firm which would become the exclusive supplier to the department. In that scenario, Boeing and LM would have prepared proposals that advanced the case for each to be the survivor of the down select. Once the DOD had completed the competition and chosen its sole supplier, the winner likely would have absorbed the losing company's valuable launch vehicle resources, skilled personnel, and facilities.

In deciding how to proceed in its own investigation and negotiations with the DOD, the FTC was aware that the government's national security purchasing agencies ultimately could resort to this procurement strategy to achieve their goals if they concluded that having a single supplier best served their interests. The DOD was partly constrained in pursuing the down select strategy by a national space policy presidential directive that dictated maintenance of two separate families of launch vehicles (i.e., Lockheed Martin's Atlas and Boeing's Delta).¹⁰⁴ Nonetheless, the DOD might still have obtained a relaxation of this requirement and received authorization for a down select to proceed.

The FTC decided to close its investigation and clear the transaction with soft concessions from the government purchasers that they would consider new entrants, but without hard concessions embedded in an enforceable order. This decision poses the question of whether the Commission's participation in the ULA episode made any positive

¹⁰³ In an action by the FTC for a preliminary injunction to enjoin the merger, the federal court could take one of essentially two paths to allow the joint venture to proceed. The court could conclude that the efficiency benefits of the parties outweigh the anticompetitive harms posited by the FTC, or the court could find, in determining whether the public interest dictated the issuance of an injunction, that the national security concerns advanced by the DOD favored clearance of the joint venture.

¹⁰⁴ See SPACE LAUNCH REPORT, *supra* note 94, at xiv-xv (describing National Space Policy Transportation directive issued in December 2004); Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 ("To avoid losing the ability to launch critical national security payloads, the National Space Transportation Policy requires the Department to sustain two evolved expendable launch vehicles (EELV) until the Department can certify assured access to space through reliance in a single vehicle.").

contribution to competition for launch vehicles and related services or to the quality of decision making regarding mergers and joint ventures in the aerospace and defense industry. The FTC did take some steps to mitigate the transaction's possible adverse vertical foreclosure effects. With the DOD, the Commission agreed upon settlement terms that would limit the ability of ULA to discriminate against future launch services entrants and to disadvantage rival suppliers of satellites.¹⁰⁵ The ULA parties agreed to these terms and the DOD established a compliance mechanism to see that the requirements would be fulfilled.

The Commission also attempted to make the terms of the resolution of the matter more transparent.¹⁰⁶ It sought and received from the DOD a letter that detailed the Department's reasons for endorsing the transaction.¹⁰⁷ In doing so, the FTC effectively pressed the DOD to put its cards on the table, go beyond vague assertions of a national security interest, and describe more fully how the formation of the ULA venture would serve national security goals. The DOD letter spelled out the economies of scale rationale for the consolidation and spoke (at a high level of generality) of being receptive to efforts by new entrants to qualify as suppliers to the national security customers.¹⁰⁸ The DOD also expressed its confidence that an enhanced launch vehicle acquisition strategy and the application of government procurement mechanisms to monitor supplier costs and other aspects of contractor operations would ensure that the Department obtained launch services from ULA on reasonable terms.¹⁰⁹ The letter did not address the possibility that, with a seemingly uncontestable position as the sole supplier of national security launch services, ULA might feel less urgency over time to perform at the highest level—notwithstanding the availability to the DOD of nominally formidable monitoring tools.

This correspondence between the DOD and the FTC was made public when the parties announced the agreement, along with a detailed closing statement by the FTC itself. By its insistence on disclosure of the DOD's

¹⁰⁵ The Boeing Company, Lockheed Martin Corporation and United Launch Alliance; Analysis of Agreement Containing Consent Orders to Aid Public Comment, 71 Fed. Reg. at 60,151. By the terms of the consent decree, this requirement terminated after ten years, in 2017.

¹⁰⁶ Kovacic Statement, *supra* note 5.

¹⁰⁷ Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4.

¹⁰⁸ *See id.*

¹⁰⁹ *Id.* ("We believe that adequate oversight coupled with a prudent acquisition strategy can deliver the benefits of the joint venture while limiting the competitive risk associated with it."). The DOD's mixed record in applying its cost oversight tools did not inspire similar confidence within the Commission. The strengths and weaknesses of the government's tools for negotiating contract terms and monitoring performance for major weapon systems are examined in Kovacic, *Commitment in Regulation*, *supra* note 30.

rationale, the Commission arguably added a valuable element of accountability to DOD (and FTC) decision making and improved public understanding of the arguments that shaped the assessment of the transaction.

Finally, the FTC engaged in extensive discussions with the DOD and with NASA about measures that could facilitate entry into the launch services business in the future. The FTC staff sought to test whether the aspirations of SpaceX to qualify as a supplier to government agencies had any genuine prospects of success. In conversations with the FTC's staff and leadership, the other government agencies expressed their openness to supporting new entry. Though uncertain about the durability and reliability of these expressions of interest, the FTC perceived that the government purchasers saw the value of developing a credible alternative to ULA, even if the alternative was not fully developed or complete—in the sense that the entrant could compete effectively to serve all of the national security community's future needs. It was sufficient that the alternative be scalable such that the government purchasers could enhance its position if ULA lagged in fulfilling the reliability goals that motivated its creation. In short, the FTC was convinced that the government purchasers understood the potential hazards of being beholden to a single supplier with no credible threat to switch.

The give and take between the FTC and the DOD can be seen as a form of competition advocacy, with the FTC attempting to persuade another government department of how competition could improve the results—in quality and price—that public agencies can achieve through the procurement process. As described below, one might infer that this advocacy had some positive effect within NASA, which became instrumental in opening the door for SpaceX to become a significant government supplier. Thus, with written commitments in a consent order to resolve vertical foreclosure concerns and with spoken commitments to use best efforts to support new entry, the FTC approved the ULA venture's formation.

IV. Experience from 2006 to the Present

From a competition policy perspective, the consolidation of the nation's MTH launch capacity in the ULA venture was difficult for the FTC to swallow and a source of strong institutional discomfort. The Commission and its staff recognized that the transaction presented significant competitive risks—notably, the creation of a durable, uncontestable monopolist supplier of launch vehicles and services

essential to national security.¹¹⁰ The FTC had acute concerns that long term performance in the relevant market would suffer unless the government buyers had a credible threat to shift their purchases away from ULA and engage at least one alternative supplier. The wisdom of the FTC's decision to approve the transaction depended on its assumptions that the economies of scale efficiencies would prove to be real and robust, and that the possibilities for entry and expansion by SpaceX (or other firms) would be more than a mirage.

As described below, both assumptions that underpinned the FTC's decision have been borne out. The most sanguine view of the Commission's decision is that the agency exercised shrewd, farsighted judgment about what it would take to preserve competitive options for government buyers, and it took a well-calculated risk that SpaceX would prove to be the necessary competitive stimulant in the future. A more doubtful assessment is that the agency embraced the SpaceX entry scenario because it had no other choice—in short, that it capitulated because the creation of a launch vehicle monopoly for government missions was inevitable, either because the parties would prevail in court with the DOD's support or because the DOD, even if the federal district court upheld the FTC's view and enjoined the venture, would find a way to conduct a two-to-one down select.

A. *ULA's Reliability*

With stunning effectiveness, ULA has achieved the reliability objectives that the parties offered as a major motivation for the venture's formation.¹¹¹ As ULA's Chief Executive Officer Tory Bruno has observed, reliability is the certifying characteristic of the joint venture: "We're always on time . . . We always work. That's the core of our company."¹¹² ULA is aware that delivering superior reliability is vital at a time when SpaceX now enjoys a substantial cost advantage and is offering significant launches to commercial and government customers at prices well below ULA's.¹¹³

¹¹⁰ The creation of the joint venture clashed with policy proposals that I had made before joining the Commission. See Kovacic & Smallwood, *supra* note 25, at 102 ("We would apply a presumption that . . . the government can derive significant, additional benefits from preserving at least two competitive alternative sources for each type of weapon system, and there may be a strong case for three or even more in certain critical areas.").

¹¹¹ See *supra* note 18 and accompanying text (observing that from the time of its formation through July 30, 2020, ULA had accomplished 140 consecutive successful launches).

¹¹² Craig Mellow, *Tory Bruno, the Other Rocket Man*, AIR & SPACE MAG., June 2018, at 64, 69.

¹¹³ *Id.* at 69 (reporting that as of mid-2018, "the basic sticker price" for a ULA Atlas V launch was \$109 million compared to \$61 million for a SpaceX Falcon 9 launch).

Would Boeing and Lockheed Martin have achieved a similar success rate had ULA not been approved and the two firms had operated independently? That is an unanswerable counterfactual. There is evidence, however, that the integration of capabilities advanced by Boeing and LM as a foundation for more efficient operations took place haltingly and incompletely. In a profile of Tory Bruno published in 2018, journalist Craig Mellow described the difficulties that ULA faced in melding the predecessor organizations into a cohesive team:

The original idea behind ULA was to reap efficiency by combining two formerly competing rocket families, Lockheed's Atlas and Boeing's Delta. It didn't quite work out that way. Under the joint ULA roof, the two clans remained separate, if not hostile, duplicating management functions and costs from top to bottom. "The staffs from the two product lines didn't really mix all that much," Bruno says. "They had their own cultures." He banged his subordinates' heads together, leaving "one-third fewer boxes on the organization chart."¹¹⁴

In retrospect, the FTC and the DOD should have been more skeptical about the efficiency claims that depended on the harmonious integration of the Boeing and LM rocket teams. The amalgamation of fierce rivals into a single enterprise, in almost any institutional setting, ordinarily faces strong internal resistance. A full knitting together of the predecessor bodies after a merger, and the subsequent creation of a new collective spirit, may take years to accomplish (if it happens at all).¹¹⁵ The fact that the ULA partners had recently engaged in bitter litigation involving competition for launch contracts¹¹⁶ and that Boeing and LM were antagonists in other weapon system markets, such as combat aircraft,¹¹⁷ provided further reason to doubt that the new venture would benefit significantly from the combination of its founders' rocket production and launch operations systems. Nothing about the relationship between Boeing and LM before they announced the ULA venture suggested that the firms would work well together and the FTC should have pressed the parties to better explain how the companies expected to overcome the enmity between them.

¹¹⁴ *Id.* at 67.

¹¹⁵ The examination of hundreds of mergers over the years should have given the FTC a keener awareness of the serious problems that post-merger integration poses, even for deals that ultimately are by some measure successful.

¹¹⁶ See *supra* notes 46–47 and accompanying text (describing claims and counterclaims advanced by Lockheed Martin and Boeing in federal district court litigation regarding alleged misconduct in connection with competitions to obtain launch contracts with the US government).

¹¹⁷ Boeing currently produces the F-15, and Lockheed Martin produces the F-35 fighters. The companies regularly vie with each other for sales of these and other aircraft designs (such as trainers) to the US government and to foreign countries. See Lou Whiteman, *Lockheed Martin, in a Dogfight with Boeing, Puts the F-35 on Sale*, MOTLEY FOOL (May 18, 2019, 12:21 PM), <https://perma.cc/Q5YA-LHUB>.

There remains the interesting question of how ULA has been able to achieve a perfect record of successful launches since the formation of the venture. To what extent did the efficiencies that Boeing and Lockheed Martin anticipated in 2006 actually come to pass? Were there efficiency benefits that the parties did not anticipate *ex ante* but nonetheless emerged unexpectedly as the venture proceeded? These issues would seem to be worthy of additional study by the DOD and the FTC to improve their understanding of what industrial measures improve performance in this dimension.

B. *The Successful Development of SpaceX*

Has SpaceX evolved into an increasingly credible supply alternative for commercial and government purchasers alike? Unmistakably, it has done so, often in a disruptive fashion that has upset prevailing assumptions about rocket design, testing, and pricing. In the most general terms, SpaceX has embraced the role of a maverick, untethered by norms that discourage experimentation and innovation.¹¹⁸ As Craig Mellow has written:

Among space enthusiasts, [Elon] Musk and the company he founded, SpaceX, are the disrupters, the swashbuckling innovators whose cheap, reusable rockets will pave the way for an explosion of orbital commerce and creativity. Old Space, according to this construction, stays hopelessly mired in the past.¹¹⁹

With its disruptive entry into the space industry, SpaceX has become the antidote to any complacency on the part of ULA.¹²⁰ By some measures, SpaceX has become the preeminent US supplier of launch services.¹²¹ As journalist Irene Klotz observes, a new wave of entry spearheaded by SpaceX has given government purchasers a range of options that seemed improbable in 2006:

It is a problem the U.S. Air Force once wished it had: multiple companies competing to launch its mission-critical satellites into a range of earth orbits. Now, legacy contractor

¹¹⁸ In describing the relationship between SpaceX and NASA, Christian Davenport has noted the “tension between the safety-obsessed space agency and the maverick company run by Musk, a tech entrepreneur who is well known for his flair for the dramatic and for pushing boundaries of rocket science.” Davenport, *Safety Experts’ Glare*, *supra* note 21, at A1. Davenport adds: “In this culture clash, SpaceX is the daring, Silicon Valley-style outfit led by a man who literally sells flamethrowers on the Internet and wholeheartedly embraces risk.” *Id.*

¹¹⁹ Mellow, *supra* note 112, at 64.

¹²⁰ *See id.* at 66–69 (describing how entry and expansion by SpaceX led ULA to alter its business strategy).

¹²¹ For example, in 2018, SpaceX completed twenty missions, over sixty percent of the US launches for the year. Irene Klotz, *On the Ascent*, AVIATION WK. & SPACE TECH., Dec. 24, 2018–Jan. 13, 2019, at 80.

United Launch Alliance . . . is in a fight for its existence as it squares off against SpaceX—which in 2016 broke ULA's monopoly on the military's space launch business—and new offerings from Northrop Grumman and Jeff Bezos' startup Blue Origin.¹²²

Among other effects, the presence of SpaceX and other launch vehicle producers has pressed ULA to reduce the price it offers government buyers and to undertake major improvements in its line of launch vehicles.¹²³

SpaceX has performed well in four noteworthy areas of endeavor:

* *Technical Proficiency.* SpaceX has emerged as an innovative force in launch vehicle design, production, and operations.¹²⁴ Among the most notable achievements is the development of a reusable vehicle which, following a launch, can descend to the earth's surface and land on a platform, which can be located either on land or on sea.¹²⁵ The company's customers have welcomed the application of this technology (and its favorable cost-saving consequences) and SpaceX routinely uses previously launched boosters for its missions.¹²⁶ SpaceX also has developed a reusable

¹²² Irene Klotz, *Rocket Rivalry*, AVIATION WK. & SPACE TECH., June 3–16, 2019, at 32 [hereinafter Klotz, *Rocket Rivalry*]. See also Irene Klotz, *Game On*, AVIATION WK. & SPACE TECH., Apr. 9–22, 2018, at 44 [hereinafter Klotz, *Game On*] (stating that ULA “is in a fight for survival” in the competition to obtain contracts for the Air Force Launch Service Agreement program).

¹²³ See Frank Moring, Jr. & Lara Seligman, *Getting Up There*, AVIATION WK. & SPACE TECH., Apr. 17–30, 2017, at 20, 21 (reporting that as SpaceX has injected competition into launches for the Air Force Evolved Expendable Launch Vehicle program, “ULA has slashed the price of the workhorse Atlas V by about one-third, and says it will continue to drive down costs”); Greg Avery, *ULA CEO: Here's how we beat SpaceX for Space Force's big contract*, DENVER BUS. J., Aug. 20, 2020 (describing product innovations and price reductions undertaken by ULA in years since entry by SpaceX), <https://perma.cc/RNV2-AHY8>; see also Klotz, *Game On*, *supra* note 122, at 44 (reporting that SpaceX won its first Air Force contract, to deliver a GPS-3 satellite into earth orbit, by offering a launch price of \$83 million, which was approximately forty percent less than the price that ULA previously had charged the Air Force).

¹²⁴ See, e.g., Davenport, *Safety Experts' Glare*, *supra* note 21, at A1, A13 (describing SpaceX's application of novel techniques for fueling launch vehicles and industry experts' debates about its benefits and hazards); Andy Pasztor, *Musk's SpaceX Notches Another Milestone*, WALL ST. J., June 5, 2017, at B4 (reporting SpaceX's success in reusing a cargo capsule).

¹²⁵ See Frank Moring, Jr., *Reusable Rockets*, AVIATION WK. & SPACE TECH., Apr. 17–30, 2017, at 31 (describing SpaceX's progress in developing reusable launch vehicles); Andy Pasztor, *SpaceX Sticks Rocket Landing*, WALL ST. J., Apr. 9, 2016, at B4 (reporting SpaceX's success in vertically landing part of a used Falcon 9 rocket).

¹²⁶ See *First Take*, AVIATION WK. & SPACE TECH., July 15–28, 2019, at 8 (reporting NASA's award of a \$50 million contract to launch an X-ray observatory atop a previously flown Falcon 9 rocket); Irene Klotz, *Falcon Family Grows*, AVIATION WK. & SPACE TECH., Apr. 22–May 5, 2019, at 12 (recounting SpaceX's success in deploying reusable vehicle technology).

spacecraft (the Dragon) that can perform multiple deliveries into space over time.¹²⁷

The company has also progressed from the deployment of smaller versions of its Falcon launch vehicle to more powerful systems. The most notable of these is the Falcon-Heavy, which in 2018 carried another Musk-created object (a cherry-red Tesla Roadster) into space.¹²⁸ The development of a more capable family of launch vehicles is a major step toward realizing Elon Musk's vision of becoming the preeminent launch services provider to government and commercial customers.

* *Commercial Markets.* SpaceX has become an important supplier of launch services for commercial enterprises in the communications sector. Key milestones have included the successful launch in March 2017 of a communications satellite for SES and the launch of communications satellites for Iridium and for its own Starlink internet system.¹²⁹ SpaceX has helped catalyze reductions in the price of commercial launch services and facilitated entry by a host of companies that are seeking to create new communications networks with low earth orbit satellites.¹³⁰

* *Government Non-Military Launch Services.* Since the approval of the ULA venture in 2006, SpaceX has become an increasingly significant supplier of launch services for NASA.¹³¹ In 2008, NASA gave SpaceX a \$1.6 billion contract to make cargo deliveries to the International Space Station

¹²⁷ See Guy Norris, *Boeing, SpaceX Set for Key Commercial Crew Flight Tests*, AVIATION WK. & SPACE TECH., Sept. 2–15, 2019, at 51 (reporting on preparations by Boeing and SpaceX for initial tests of their crew capsules and noting that SpaceX has flown one of its Dragon cargo capsules three times); Pasztor, *supra* note 124, at B4 (describing SpaceX's success in refurbishing its Dragon capsule and relaunching it).

¹²⁸ The development of the Falcon Heavy is described in Kenneth Chang, *Falcon Heavy, in a Roar of Thunder, Carries SpaceX's Ambition into Orbit*, N.Y. TIMES, Feb. 6, 2018.

¹²⁹ Moring, Jr. & Seligman, *supra* note 123, at 21; Andy Pasztor, *SpaceX Wins Launch of an SES Satellite*, WALL ST. J., Mar. 15, 2011, at B2 (reporting decision by SES SA to give SpaceX a contract to launch a communications satellite and cataloguing the increasing portfolio of SpaceX's commercial launch bookings). In 2017–2018, SpaceX carried out eight missions in which it successfully delivered seventy-five Iridium Next Satellites into orbit. Irene Klotz, *Iridium: A 30-Year, Overnight Success Story*, AVIATION WK. & SPACE TECH., Nov. 26–Dec. 9, 2018, at 38. For descriptions of the SpaceX Starlink project, see Kenneth Chang, *SpaceX Launches 60 Starlink Internet Satellites into Orbit*, N.Y. TIMES (May 23, 2019), <https://perma.cc/V6TY-M8TR>; Aaron Pressman, *The Internet Space Race*, FORTUNE (Feb. 1, 2019), <https://perma.cc/E83K-PJQB>.

¹³⁰ Irene Klotz, *SmallSat Express*, AVIATION WK. & SPACE TECH., Nov. 26–Dec. 9, 2018, at 17.

¹³¹ See, e.g., Sarah Kaplan, *NASA's Newest Planet Hunter Launches Successfully*, WASH. POST (Apr. 18, 2018, 7:02 PM), <https://perma.cc/4LEP-QMNZ> (reporting the launch into earth orbit by a SpaceX Falcon 9 rocket of NASA's Transiting Exoplanet Survey Satellite ("TESS")).

(“ISS”).¹³² The SpaceX Cargo Dragon made its first delivery of cargo to the ISS in October 2012.¹³³ In March of 2019, SpaceX sent a prototype of the Crew Dragon spacecraft to the ISS, setting the stage for the subsequent successful flight of the Crew Dragon and its astronauts to and from the ISS in 2020.¹³⁴ The successful completion of the Crew Dragon Demo-2 mission has underscored the leadership that SpaceX now holds in its contest with Boeing to become the preeminent supplier of rockets and capsules for human space travel.¹³⁵ The company is now positioned to play a key role in developing other launch vehicle capabilities that will support other NASA space exploration projects, including human spaceflight to the Moon and Mars.¹³⁶

* *National Security Launch Services*. Not only has SpaceX delivered non-defense payloads into space,¹³⁷ it has gradually become a more significant participant in the national security segment of launch vehicle services for US government agencies.¹³⁸ In head-to-head competitions since 2014, SpaceX has beaten out ULA and been awarded a number of Air Force contracts for national security launches.¹³⁹ The most striking

¹³² Andy Pasztor, *SpaceX Dragon Capsule Links with Space Station*, WALL ST. J. (Oct. 11, 2012, 9:42 AM), <https://perma.cc/U7M2-JH7B>.

¹³³ *Id.*

¹³⁴ Irene Klotz, *SpaceX and NASA Demo-1 Paves Way for Crew Flights to ISS*, AVIATION WK. & SPACE TECH., Mar. 11–24, 2019, at 46.

¹³⁵ Christian Davenport, *Elon Musk and SpaceX Pull Off Another Feat Few Thought Possible*, WASH. POST (May 30, 2020, 7:50 PM), <https://perma.cc/Y7KG-6MUM>.

¹³⁶ See, e.g., Irene Klotz, *SpaceX Aims for Orbital Flights of Prototype Mars Ship Next Year*, AVIATION WK. & SPACE TECH., Oct. 14–27, 2019, at 67 (describing the development of the SpaceX Starship, which the company envisions to be a low-cost, reusable system to transport humans into deep space); Guy Norris, *SpaceX's Starhopper Verifies Raptor Performance for Starship*, AVIATION WK. & SPACE TECH., Sept. 2–15, 2019, at 28 (describing the successful test of a technology demonstrator incorporating the Raptor engine that will be used in the Starship system). See also Klotz, *supra* note 21, at 23 (quoting Elon Musk after the successful launch of the SpaceX Crew Dragon with two American astronauts on board: “This is hopefully the first step on a journey toward a civilization on Mars and life becoming multiplanetary for the first time in the 4.5 billion year history of the Earth”); Guy Norris, *Leave It to Us*, AVIATION WK. & SPACE TECH., Aug. 9, 2010, at 22 (quoting Tom Markusic, director of the SpaceX rocket development facility in McGregor, Texas: “Mars is the ultimate goal of SpaceX”); Andy Pasztor, *Elon Musk Aims to Land Humans on Mars by Middle of Next Decade*, WALL ST. J. (Sept. 29, 2017, 2:18 PM), <https://perma.cc/FC4N-J8W2> (describing SpaceX plans to develop a reusable spaceship to travel to Mars).

¹³⁷ See, e.g., Pasztor, *supra* note 132.

¹³⁸ See Irene Klotz & Jen DiMascio, *SpaceX Loses Out on U.S. Air Force Next-Gen Launcher Development*, AVIATION WK. & SPACE TECH., Oct. 15–28, 2018, at 38 (describing SpaceX’s inventory of national security launches through the fall of 2018).

¹³⁹ Sandra Erwin, *SpaceX Wins \$130 Million Military Launch Contract for Falcon Heavy*, SPACENEWS (June 21, 2018), <https://perma.cc/3PSV-RSNR>. In 2018, for example, SpaceX performed two national

indication of the ascending stature of SpaceX with the national security agencies came on August 7, 2020, when the US Space Force announced that it had selected SpaceX and ULA to receive five-year contracts totaling \$653 million to launch satellites for the National Security Space Launch (“NSSL”) program.¹⁴⁰ Journalist Jeff Foust remarked that, although ULA received the larger part of the NSSL contract awards, the Space Force decision underscored how far SpaceX has come since its early days as an aspiring supplier to the national security agencies: “Six years ago, SpaceX was the upstart launch company seeking to break United Launch Alliance’s monopoly on national security space launches. Now, it’s part of the establishment.”¹⁴¹ The rivalry between ULA and SpaceX for these contracts—once exclusively the domain of ULA—is intense.¹⁴²

The path to the successful outcomes described here has not been entirely smooth from either a technical or institutional perspective. SpaceX has experienced spectacular, unnerving failures with boosters and capsules.¹⁴³ In each instance, the company has treated operational failures as means to discover the path to ultimate success, striving to identify the causes of each failure and taking effective corrective measures.¹⁴⁴ Some of the company’s critics—including its rival, ULA—have suggested that SpaceX has taken too casual an attitude toward risk and underinvested in a testing regime that might reduce operational failures.¹⁴⁵ Such criticism

security missions for US military organizations, including a global positioning satellite. Irene Klotz, *Next Big Step*, AVIATION WK. & SPACE TECH., Jan. 14–27, 2019, at 26.

¹⁴⁰ U.S. Dept. of Def., Contracts for Aug. 7, 2020, <https://perma.cc/KB2P-4NAU> (announcing Air Force contract awards). ULA received task orders for \$337 million for the NSSL Phase 2 contract, and SpaceX received task orders for \$316 million for the NSSL Phase 2 contract. The two companies beat Blue Origin and Northrop Grumman, which submitted bids for the NSSL Launch Service Procurements. See Sandra Erwin, *Pentagon Picks SpaceX and ULA to Remain Its Primary Launch Providers*, SPACENEWS (Aug. 7, 2020), <https://perma.cc/423E-ADEU>.

¹⁴¹ Jeff Foust, *With Pentagon Award, SpaceX Joins the Establishment*, SPACENEWS (Aug. 7, 2020), <https://perma.cc/39JA-C2QB>.

¹⁴² See Christian Davenport, *SpaceX Pushes Ahead Even as Satellite Questions Arise*, WASH. POST, Jan. 14, 2018 (describing competition between ULA and SpaceX for national security launches); Avery, *supra* note 123 (same).

¹⁴³ See *id.* (recounting failed SpaceX launches); see also VANCE, *supra* note 11, at 367–68; Mosher & McFall-Johnsen, *supra* note 99 (quoting Elon Musk: “It took us four attempts just to get to orbit with Falcon 1 . . . People told me this joke: How do you make a small fortune in the rocket industry? ‘You start with a large one’ is the punch line.”).

¹⁴⁴ Irene Klotz, *Falcon Flying High*, AVIATION WK. & SPACE TECH., June 12–25, 2017, at 28 (reporting SpaceX efforts to correct design flaws that had caused accidents involving its Falcon launch system); Irene Klotz, *SpaceX Pinpoints Crew Dragon Abort System Flaw*, AVIATION WK. & SPACE TECH., July 29–Aug. 18, 2019, at 41 (reporting SpaceX efforts to identify and correct source of failure in unmanned test of abort system for Crew Dragon spacecraft).

¹⁴⁵ See Davenport, *Safety Experts’ Glare*, *supra* note 21 (describing criticism that the SpaceX business philosophy slights serious risks); see also Mellow, *supra* note 112.

often comes with the recognition that SpaceX has injected extraordinary vitality into the space industry and that pre-existing norms accepted by the government purchasers and its suppliers too heavily favor caution at the expense of innovation and technological progress, at least in the case of unmanned space flight.¹⁴⁶

The institutional hurdles to becoming a valued supplier to government agencies have also been formidable. The relationships between SpaceX and its US government customers have not been free from friction. From time to time, SpaceX has accused NASA and the DOD of taking steps to diminish the company's access to government funding and launch services contracts, and of attempting to reinforce the preeminence ULA enjoyed at the time of its formation in 2006.¹⁴⁷ On two occasions, SpaceX has sued the Air Force on the ground that it unreasonably excluded SpaceX from contract awards. In 2014, SpaceX filed a bid protest to challenge sole source awards the Air Force had made to ULA for heavy launch contracts.¹⁴⁸ The protest appears to have led the Air Force to open more of its business to competitive bidding. In 2019,, SpaceX filed another bid protest to challenge the decision by the Air Force in October of 2018 to not award ULA a contract for the Phase I Launch Services Agreement.¹⁴⁹ The Air Force and SpaceX settled this dispute on terms that appear to have enabled the company to participate in the Air Force program. There have also been suggestions that NASA unjustifiably has subjected the SpaceX Crew Commercial program to more exacting safety audits than Boeing.¹⁵⁰

¹⁴⁶ See Mellow, *supra* note 112, at 66 (quoting Tory Bruno, head of ULA's Atlas and Delta rocket unit: "Elon Musk is someone you have to absolutely admire for the excitement he has brought back to space . . . Space was getting kind of boring for the general public"); see also Davenport, *Safety Experts' Glare*, *supra* note 21 (quoting Professor and Member of the Presidential Transition Agency Review Team for NASA, Greg Autry: "NASA is supposed to be a risk-taking organization . . . But every time we would mention accepting risk in human spaceflight, the NASA people would say, 'But, oh, you have to remember the scar tissue'—and they were talking about the two shuttle disasters. They seemed to have become victims of the past and unwilling to try anything new, because of that scar tissue").

¹⁴⁷ See Davenport, *Biggest Challenge*, *supra* note 20 (describing collusion between SpaceX and its chief government buyers, NASA and the DOD).

¹⁴⁸ See Amy Butler & Amy Svitak Farnborough, *Competitive Thrust*, AVIATION WK. & SPACE TECH., July 21, 2014, at 31 (describing SpaceX's bid protest against the US Air Force).

¹⁴⁹ See Klotz, *Rocket Rivalry*, *supra* note 122, at 32. The Air Force awarded LSA contracts to ULA subsidiary United Launch services, Blue Origin, and Northrop's Orbital Sciences Corporation.

¹⁵⁰ See Christian Davenport, *Boeing Faced Only 'Limited' Safety Review from NASA, While SpaceX Got a Full Examination*, WASH. POST, Nov. 29, 2019.

V. Policy Implications Going Forward

A. Government Procurement Policy as a Stimulus for Competition

The success of SpaceX has depended crucially upon the fulfillment by the government buyers of their soft commitment in 2006 to consider SpaceX as an alternative to ULA. NASA was the pivotal actor in this process. The agency encouraged the development of a new business model that relied principally on the private sector to devise, deploy, and operate space vehicles.¹⁵¹ Journalist Richard Waters well describes the significance of contributions of NASA and the entrants it helped inspire:

The emergence of a start-up space industry, led by Elon Musk's SpaceX and Jeff Bezos's Blue Origin, has led to a new symbiosis in space. The tech groups see Nasa as an important early customer as they pursue their grand long-term visions – while the space agency has found ways to ride on the back of their development work rather than create the technology for its programmes from scratch.¹⁵²

From 2006 onward, NASA gave increasingly stronger signals that it would entertain offers from SpaceX to provide non-military launch services and it gave the company contracts for smaller launches that foreshadowed additional work in the future. In his first term, President Barack Obama made a bold and controversial decision to rely chiefly on a not yet well developed commercial space sector to provide an essential foundation for the nation's space exploration program.¹⁵³ From the initiation of the Mercury program through the end of the Space Shuttle programs in 2011, the United States purchased hardware and services from external suppliers. NASA owned the space system assets and operated the facilities from which they were launched into space. The new approach anticipated that private firms would build launch vehicles and spacecraft and send them into space (often using launch pads leased from or acquired from the government).

An important step toward creating an environment that enabled entry by SpaceX and other private firms into the launch services sector

¹⁵¹ See Mosher & McFall-Johnsen, *supra* note 99 (quoting NASA Administrator Jim Bridenstine: “We don't want to purchase, own, and operate the hardware the way we used to. We want to be one customer of many customers in a very robust commercial marketplace in low-Earth orbit . . . This is the next era in human spaceflight, where NASA gets to be the customer. We want to be a strong customer; we want to be a great partner. But we don't want to be the only ones that are operating with humans in space”).

¹⁵² Richard Waters, *Which Company will Win the New Space Race to the Moon?*, FIN. TIMES (July 18, 2019), <https://perma.cc/2FSA-MSMT>.

¹⁵³ On this policy adjustment, see Davenport, *Biggest Challenge*, *supra* note 20; Christian Davenport, *With a Spacecraft in Trouble and the White House Watching, SpaceX had to Deliver*, WASH. POST (Mar. 16, 2018, 7:23 AM), <https://perma.cc/CXF4-JUPR>.

was NASA's creation of the Commercial Orbital Transportation Services ("COTS") program.¹⁵⁴ COTS anticipated that private firms would have the ability to provide space transportation capabilities and provide, beginning in 2011, launches to supply the ISS.¹⁵⁵ This was the first in a series of measures that spurred the development of SpaceX and other new entrants, including Blue Origin, which is owned by Jeff Bezos, the founder of Amazon.

Encouraged by a largely successful series of launches, in 2014 NASA took the still bolder step of selecting SpaceX (along with Boeing) to participate in its Commercial Crew Program, in which NASA would rely on private firms to build and operate the next generation of human space transportation systems.¹⁵⁶ Although Boeing received a larger share of NASA funds for the program,¹⁵⁷ SpaceX was first to return US astronauts to space with an American-made vehicle launched from the United States.¹⁵⁸ SpaceX is one of three firms (along with teams headed by Blue Origin and Dynetics) that NASA has chosen to compete to provide the space agency with a system to land humans on the Moon.¹⁵⁹

Through these and other measures, NASA departed in significant respects from the stereotype of government buyers as being captured by commercial interests, exceedingly risk averse in program design, and incapable of creative thinking that uses the power of public purchasing to stimulate competition among suppliers. Over the past fifteen years, NASA has pursued a conscious strategy to encourage entry that expands the number and quality of centers of inventive and productive activity that can serve its needs. NASA also has shown patience in tolerating occasional failures that entrants must experience to gain capability and achieve dramatic design breakthroughs and improvements in performance. The

¹⁵⁴ See Steven Mumma & Natalie Imfeld, *Advancing the Nation's Space Program Through Commercial Space Services Acquisition*, CONT. MGMT., Mar. 2014, at 16 (describing NASA's creation of COTS); Guy Norris & Madhu Unnikrishnan, *In the Dragon's Den*, AVIATION WK. & SPACE TECH., Nov. 29, 2010, at 28.

¹⁵⁵ *Id.* Over the past decade, NASA has used three firms—SpaceX, the Orbital ATK division of Northrop Grumman, and Sierra Nevada Corporation—to deliver cargo to the International Space Station. Irene Klotz, *Passing the Torch*, AVIATION WK. & SPACE TECH., June 18–July 1, 2018, at 58–59.

¹⁵⁶ Irene Klotz, *Crew Dragon Debuts*, AVIATION WK. & SPACE TECH., May 4–17, 2020, at 14; Klotz, *supra* note 21, at 26 (quoting former manager of NASA's Space Shuttle program, Wayne Hale: "The Commercial Crew program has been a great experiment by NASA to see if commercial companies can do this particular job."); Tony Reichhardt, *Astronauts, Your Ride's Here!*, AIR & SPACE MAG., Aug. 2018, at 40. The origin and evolution of the Commercial Crew Program are described in Klotz, *supra* note 155, at 58–61.

¹⁵⁷ NASA awarded Boeing and SpaceX \$4.2 billion and \$2.6 billion, respectively. Klotz, *supra* note 156, at 14.

¹⁵⁸ See *supra* note 130–135 and accompanying text.

¹⁵⁹ Irene Klotz, *Lunar Landers*, AVIATION WK. & SPACE TECH., May 18–31, 2020, at 14.

NASA experience warrants close study by other government purchasing authorities as a model of how well-calculated risk taking in the expenditure of public funds can facilitate procompetitive entry by new suppliers, even into unusually difficult technological domains.

B. *The Role of the Antitrust Agencies*

The ULA competition review in 2006 and the evolution of the launch vehicle sector suggests several features of good practice for antitrust agencies and public procurement authorities in evaluating the competitive effects of mergers. The experience underscores the value of systematic collection of data and analysis about past experience. The consideration of arguments from 2005–2006 about reliability improvements arising from the formation of ULA benefitted enormously from work done by the DOD, RAND, and other researchers about scale economies and learning in the design and production of complex systems.¹⁶⁰ The data provided confidence that ULA's creation could yield important improvements in performance.

The ULA case also indicates the value of cooperative interagency policy making that enables distinct institutions with shared or complementary policy duties to diagnose problems and devise solutions. The DOD collaboration with the FTC facilitated an informed decision-making process and helped both institutions apply their skills usefully to the problem. The analysis also profited greatly from the accumulation of relevant expertise in both agencies over time—in the DOD, greater knowledge about the substance and process of antitrust law, and in the FTC, greater knowledge about the aerospace and defense industries and about procurement decision making in the DOD.

C. *Meaningful Disclosure*

The ULA experience suggests the value of a transparent revelation of the reasons for decisions taken. The ULA decision made the DOD and the FTC nervous, and there were temptations to offer less informative, general explanations of the reasons for the outcome. A more complete description of the reasons for a difficult decision exposes a government agency to more second guessing, but it injects needed discipline into the decision-making process itself. By putting their cards face up on the table, and setting out the key assumptions behind the ULA decision, the DOD and the FTC enabled students of competition law and defense acquisition to better understand what happened, to see what worked, to identify what

¹⁶⁰ See *supra* notes 106–109 and accompanying text.

failed, and to do it better the next time.¹⁶¹ That said, the transparency could have been greater. For example, the FTC could have said more about its doubts that new entry would eventually take place and its concerns about the efficacy of the DOD's monitoring and oversight tools to press ULA to control costs. Careful documentation of initial expectations provides an important foundation for ex post evaluations that can illuminate how antitrust agencies (and procurement authorities) can improve decision making in future merger analysis.

D. *Innovation in Merger Analysis*

The large experience that the DOJ and the FTC have gained from reviewing mergers in the aerospace and defense industry can be a valuable source of insights into how antitrust policy can account for innovation issues in other sectors. The evaluation of the ULA transaction and numerous other A&D mergers suggests several focal points for study of innovation effects in any transaction.¹⁶²

An essential starting point is to identify the industrial competencies needed to design and produce the product or service in question. The second step is to determine which firms currently possess those competencies and assess the strength of each competency within the firm. For technologically dynamic sectors, for example, the firm's proficiency often depends on the volume of its expenditures for research and development and the types of R&D projects it is undertaking to stay at the frontier of the technical state of the art. A third step is to assess the firm's capacity to take innovative ideas, translate them into inventive designs, and produce the product or service in question. Past success in running a functioning production program—solving problems associated with the organization of workflow, assembly of component parts, and application of quality control techniques—can be a valuable indicator of the firm's ability to design new products that will work and build them effectively. A fourth step is to evaluate the firm's proficiency in accomplishing post-production maintenance and repair functions and in devising and

¹⁶¹ With the FTC's encouragement, the DOD explained why it supported the DOJ's lawsuit to block General Dynamics' purchase of Newport News Shipbuilding, where the fear was that a merger to monopoly would reduce innovation in the design and production of submarines. See Press Release, U.S. Dep't of Just., *supra* note 63; see also Letter from Kenneth J. Krieg to Deborah Platt Majoras, *supra* note 4 (“[T]he national security interests present in this transaction distinguish the Department's analysis of this transaction from our analysis of the 2001 acquisition of Newport News Shipbuilding by General Dynamics, which would have resulted in a nuclear shipbuilding monopoly.”)

¹⁶² These are reviewed in Kovacic, *Postconsolidation Defense Industry*, *supra* note 30, at 476–80; Kovacic & Smallwood, *supra* note 25, at 103–20.

installing upgrades that account for experience gathered in the course of using the product and responding to changing conditions.

The DOJ and FTC experience with aerospace and defense transactions has involved many applications of this basic framework. The analytical tools and institutional know-how accumulated from A&D merger reviews are readily transferable to the analysis of mergers in other technologically dynamic sectors, extending from the earliest stages of the R&D pipeline to the routine deployment of the products or services.

E. Case Retrospectives

The analysis used in this Article suggests a basic, useful approach that competition agencies can use to evaluate and improve their decision making in merger reviews. The essence of the approach is to examine the assumptions and predictions that guided the agency's analysis, compare those assumptions and predictions to actual experience, and (where actual experience deviates from the predicted outcome, or contradicts the initial assumptions) ask what the agency might have missed in its original assessment and what it should look for in conducting future reviews.

Merger analysis sometimes involves making difficult judgments about likely future events based on information that is inevitably incomplete or lends itself to conflicting interpretations. Retrospective analysis that compares assumptions and predictions to actual results can improve future inquiries by identifying overlooked factors or providing a better basis to judge whether conceptual possibilities (e.g., the realization of efficiency benefits) are likely to come to pass. The value of the retrospective study depends heavily on the completeness and honesty with which the agency documents its initial analysis, key assumptions, and predictions, and whether it tests this analysis against actual outcomes.

The identification of actual results may benefit from collecting information *ex post* from the merged entity and other industry participants. One can even imagine convening discussions, after enough time has passed, in which the government decisionmakers (here, the FTC and the DOD) and the private parties and their advisors review the decision-making process and the results of the transaction.

Conclusion

By combining the nation's MTH launch capability for US government missions into a single enterprise, the creation of the ULA joint venture contradicted the basic presumptions that the federal antitrust agencies ordinarily brought to the analysis of transactions in the aerospace and defense sector. The agency responsible for the antitrust review of the

transaction, the Federal Trade Commission, had strongly disfavored mergers to monopoly. Departures from this policy had been rare and had required exceptional justifications. The DOD endorsed the ULA venture and probably would have testified in favor of its approval had the FTC chosen to go to court to enjoin the deal. The DOD's support created powerful pressure for the FTC to acquiesce, and the agency allowed the transaction to proceed subject to conditions that addressed vertical features of the venture.

A plausible efficiency rationale supported the DOD's support for the ULA venture and influenced the FTC's assessment. A decline in the number of launches for US government customers threatened to deny the ULA partners, Boeing and Lockheed Martin, the level of activity needed to maintain the proficiency of their design, production, and launch teams at the highest levels. Thus, the continued subdivision of launches between the two companies could undermine their reliability and result in an unacceptable number of launch failures for government missions.

A large body of experience from previous aerospace programs indicated that concerns about learning and scale economies were not illusions. Yet the DOD and the FTC still had to confront the possibility that, at some point after the joint venture's formation, the ULA partners might experience a loss of urgency to control costs and, more important, achieve qualitative improvements in their launch systems. How would government purchasers motivate the joint venture to improve performance if they had no credible threat to switch to an alternative supplier? What was the fallback for the government if ULA, perceiving itself to be the only means for the government to launch payloads into space, shirked?

Before closing its inquiry, the FTC sought assurances from the DOD and NASA that the government purchasers would seek to qualify other firms to provide launch services. The DOD and NASA acknowledged the dangers of relying on a single supplier (ULA), but they provided only spoken assurances—no written commitments—to exercise best efforts to encourage entry by other firms into this technologically complex and capital intensive industry. No company appeared to be an especially attractive candidate to succeed as a new entrant, even with encouragement from the DOD or NASA. SpaceX made presentations to the FTC and predicted that it could use innovative rocket designs to surpass ULA if it received launch services contracts from the government purchasers. Yet, at the time of the FTC's antitrust review, SpaceX had yet to carry out a successful launch of its rocket, the Falcon.

Thus, aided by the DOD's formidable institutional support, a plausible efficiency justification, and a fragile possibility for new entry into the launch services sector, the ULA venture received antitrust clearance. To the relief of the government actors (certainly for the FTC

and the author, and probably for the DOD), experience over the past fifteen years has been astonishingly positive. ULA has achieved an unblemished record of successful launches since its creation, though it is unclear that Boeing and Lockheed Martin achieved the smooth integration of teams that the parties held out as the foundation for improved reliability. And SpaceX has thrived. Even the hardest optimist could not have imagined in 2006 that by 2020 SpaceX and other new entrants into rocketry would have established themselves as credible alternatives to ULA as suppliers of launch services to the US government. On the basis of its success to date in launching human and non-human payloads, SpaceX arguably has drawn even with (if not surpassed) ULA in the race to become the country's (and the world's) preeminent launch services provider.

To recite this favorable series of events is not to say that continued success is inevitable. The history of space exploration has made clear that its participants—government agencies and commercial enterprises alike—can take nothing for granted. There are many tests ahead to determine whether SpaceX or firms such as Blue Origin and Orbital ATK (now owned by Northrop Grumman) can demonstrate the sustainability of a new, more commercially oriented business model for launch services. But it is appropriate to take a moment to recognize that the ULA partners and SpaceX thus far have accomplished what they set out to do in 2006, and that the hesitant spoken promises of best efforts that the DOD and NASA gave the FTC ripened into a series of procompetitive measures that facilitated entry.

Beyond the launch services sector, the ULA experience provides some guidance for future policymaking by the antitrust agencies and government purchasers. The developments with ULA, SpaceX, and other commercial launch services firms were not the product of mere luck. The DOD and the FTC applied their knowledge of the aerospace industry to make sophisticated, principled judgments about the possible learning curve and scale economies rationales that Boeing and Lockheed Martin offered as bases for creating ULA. This highlights the benefits that agencies can realize from applying expertise gained from having processes and organizational methods that bring past experience to bear upon the analysis of new problems.

Also noteworthy for future merger analysis is the positive role that the government purchasers—first NASA and then DOD—played in providing opportunities for SpaceX to develop as a supplier of launch services for government missions. The government buyers understood the difficulties they would face if they did not encourage new entry as an option to ULA and a stimulus for innovation in the design of space launch systems. The establishment of a commercial space services sector has broader implications, as it demonstrates how creative procompetitive public

procurement policies can diversify highly concentrated markets and catalyze unanticipated improvements in products and services.

NASA, in particular, embraced an entrepreneurial approach that required the agency to modify longstanding methods for obtaining launch services. This experience should motivate procurement policymakers, in Congress and in government agencies, to reassess existing views about government procurement and the benefits and costs of having public purchasing bodies experiment with novel techniques. The ULA experience suggests there is an untapped potential for public procurement to boost competition that improves the nation's wellbeing, but the realization of the potential will require the use of methods that are novel and, in some senses, more risky than traditional procurement approaches. If the nation is willing to accept, as it should, more innovation and risk taking in the procurement process, it will have to acknowledge that innovation and risk taking sometimes result in program failures. These failures can be accepted as a necessary price to pay for the good results that innovation and risk taking can yield, or the failures can be seen as proof that adherence to existing routines is the only way to spend the public's money. There is impressive evidence that some of the country's most impressive, innovation-rich experiences have emerged from entrepreneurial risk taking by government agencies and procurement teams, and the path to ultimate success included major setbacks.¹⁶³ Perhaps the ULA/SpaceX experience can embed in our minds how the willingness to take well-calculated risks (which differs considerably from simple throw-of-the-dice gambling) and to learn from the failures that sometimes occur can open the door to product and service breakthroughs that transform industries for society's great benefit.

The evaluation of the ULA transaction in 2005–2006 also underscores a consideration that should be paramount in the thinking of the antitrust agencies and the government purchasers when examining future proposed mergers that will have a highly concentrative effect, such as reducing the number of suppliers to two firms or a single survivor. What will the government buyers do if the remaining firm or firms perform inadequately—for example, by exercising weak discipline over costs, failing to provide desired levels or quality, or showing little imagination or initiative in developing new technologies or designs? It

¹⁶³ Some of the country's greatest, innovation-rich successes in the aerospace and defense fields have emerged from entrepreneurial risk taking by government agencies, their procurement teams, and private suppliers. Before achieving breakthroughs, the government purchasers and their contractors in a number of instances have had to overcome major setbacks. See *generally* EYE IN THE SKY: THE STORY OF THE CORONA SPY SATELLITES (Dwayne A. Day, John M. Logsdon & Brian Latell eds., 1998) (essays recounting the development and deployment of the Corona reconnaissance satellite system).

seems that a vital element of the answer to this question is always to think in terms of fostering one or more alternatives. These options need not be immediately available to be effective, as the emergence of SpaceX from 2006 onward suggests. For an incumbent supplier, the buyer's conscious attention to encouraging new entry is an antidote to complacency. For the buyer, pro-entry policies may create unimagined possibilities for addressing the government's needs. For these reasons, the ULA and SpaceX story deserves careful, continued study by competition policy specialists and procurement policymakers for decades to come.