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HEAVEN OR HELL: THE FUTURE OF THE UNITED STATES LAUNCH SERVICES INDUSTRY

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INTRODUCTION

This article examines the international market for commercial satellite launch services[1] and assesses the desirability of certain possible U.S. government actions to bolster the sagging fortunes of U.S. launch companies.

Part I canvasses the industry background and its current state. After documenting the declining market share of U.S. launch companies, this part measures demand over the coming ten years against worldwide launch capacity. It concludes that the rest of the 1990s and the beginning of the next century will be characterized by increasingly fierce competition for a limited number of satellite launch contracts, because declining demand will be coupled with rising capacity.

Part II examines the market and non-market factors that undergird competition in the launch industry. The relative advantages and disadvantages of the current market participants are compared, and results (i.e., projected market shares) are reviewed. Part II draws some sobering

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1. The paper focuses the segment of the launch industry that place satellites in geosynchronous orbit ("GEO"). GEO is an orbit with an altitude of several thousand miles in which satellites circle the Earth at the same rate that the Earth rotates. Thus, if a satellite is in GEO over the equator, it will seem to hang in a single spot. Most GEO applications are telecommunications-related. Geosynchronous transfer orbit ("GTO") is a highly elliptical orbit into which many satellites are launched and then moved by on-board rocket thrusters to GEO. Low Earth Orbit ("LEO") places the satellite in a continuous orbit around the Earth. Remote sensing is an example of an LEO application. *See generally* SPACE COMMERCE: PROCEEDINGS OF THE THIRD INTERNATIONAL CONFERENCE ON THE COMMERCIAL AND INDUSTRIAL USES OF OUTER SPACE (3d. ed. 1990). The GEO market constitutes a fairly distinct segment of the launch services industry, although some GEO boosters are also used for LEO launches. *See, e.g., Lockheed to Introduce New Generation of Midsized Satellite Launchers*, SATELLITE WK., May 10, 1993, *available in* LEXIS, News Library, Curnws File (reporting that McDonnell Douglas' Delta II will be used to launch several LEO satellites for Motorola's Iridium System).

conclusions for U.S. suppliers: absent some form of government intervention, American launch companies cannot remain competitive with foreign suppliers in the GEO launch market. It does appear, however, that the competitive advantages of foreign launch providers are not entirely the product of free-market economics. Instead, the Europeans and other suppliers have received substantial direct and indirect government subsidies that exceed the level of public support provided to U.S. launch companies.

After reviewing the increasingly competitive market and its determinants, Part III outlines current international agreements and ongoing negotiations regarding trade in launch services. The recently signed agreement on trade in services of the General Agreement on Tariffs and Trade ("GATT") may apply to trade in launch services. Unfortunately, GATT enforcement mechanisms per se are nearly worthless to protect against unfair competition in launch services. Bilateral agreements offer more hope, although enforcement is difficult in this case as well. Moreover, because "catch-up" is a difficult game to play, it is unclear whether fair trade rules alone can ensure the future health of U.S. launch companies.

Given the inadequacy of bilateral and multilateral trade agreements, Part IV examines the proposal made by many rocket makers that the U.S. government take steps to aid domestic launch services providers. Part IV begins by arguing that a broad-based domestic expendable launch vehicles ("ELV") manufacturing capability is essential, then proceeds to examine two specific options: domestic trade laws and industrial policy. This part finds that some peculiar features of trade in launch services make most trade remedies unhelpful. A claim under Section 301 of the Trade Act of 1974[2] may offer an appealing avenue for dealing with recalcitrant non-market economy ("NME") competitors[3] who price at below-market levels. As a general matter, however, the political side-effects of such tactics may outweigh any direct benefits. A more promising approach would include certain regulatory measures and other direct assistance that the U.S. government could provide to launch services companies. This part concludes that a government-industry partnership to research and develop new launch vehicles represents the single best solution to the

2. 19 U.S.C. § 2411 (1988).

3. By this phrase, the author wishes to refer to China and Russia. Although each of these two countries' economies is currently undergoing dramatic changes, there is little argument that the space sector in each nation is populated largely with state-run enterprises.

crisis facing launch services providers.

I. THE COMMERCIAL LAUNCH SERVICES INDUSTRY: BACKGROUND AND A CURRENT ASSESSMENT

A. *Loss of the United States Launch Services Monopoly*

Except for the space activities of the NMEs, the U.S. government had a virtual monopoly on rocket launching until the end of the 1970s.[4] Under this regime, parties desiring to place a satellite in orbit contracted with NASA, which, in turn, purchased a rocket from one of three manufacturers.[5] Customers were charged "actual cost"[6] plus the requisite NASA mark-up. Thus, the market for launch services was mediated through the U.S. government, which also happened to be the largest end-user of launches.

As the 1970s drew to a close, two developments changed this situation. NASA began gearing up for the operation of the Space Shuttle and started to force all payloads off the ELV fleet and onto the Shuttle manifest.[7] NASA planned to phase out all ELVs in the U.S. inventory as the Shuttle became fully operational.[8] Simultaneously, a European

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4. This history of the commercial space industry is drawn from CONGRESSIONAL BUDGET OFFICE, SETTING SPACE TRANSPORTATION POLICY FOR THE 1990'S 5-15 (1986) [hereinafter SETTING SPACE TRANSPORTATION POLICY] and Doug Heydon, *International Trade and Launch Pricing*, 38 FED. B. NEWS & J. 140 (1991).

5. McDonnell Douglas (the "Delta" rocket series), General Dynamics (formerly the "Atlas/Centaur" rocket series), or Martin Marietta (the "Titan" rocket series). *See generally* Glenn H. Reynolds & Robert P. Merges, *Toward an Industrial Policy for Outer Space: Problems and Prospects of the Commercial Space Launch Industry*, 29 JURIMETRICS J. 17 (1988) [hereinafter Reynolds & Merges].

6. "Actual cost," in this case, really means "marginal cost" because customers were not charged for the value of government research and development efforts on launch vehicles, government provisions for insurance, and launch facility fixed costs borne by the government. *See* Heydon, *supra* note 4, at 140.

7. Despite criticism for putting all of its eggs in one basket, NASA pushed hard for the Shuttle to supplant ELVs completely. *See id.*, at 140; SETTING SPACE TRANSPORTATION POLICY, *supra* note 4, at 12-13. This was apparently because NASA was forced to "oversell" the project to Congress and needed as many commercial customers as possible to keep costs down. *See* Reynolds & Merges, *supra* note 5, at 14. *See generally* John M. Logsdon, *The Space Shuttle Program: A Policy Failure?*, 232 SCIENCE 1099 (1986) (noting that the Space Shuttle was "sold" to Congress as a complete system for U.S. spacelift needs).

8. Of course, NASA's proposed phase-out of ELVs also meant the demise of the commercial launch industry. *See Commercial Space Industry Stages Major Comeback*,

government-industry cooperative initiative to develop an independent space launch capability, Arianespace, was coming to fruition.[9] By the end of the decade, the United States was well on its way out of the ELV business, while Europe launched its first Ariane rocket and prepared to fill the void left by the departure of U.S. ELV manufacturers.

In 1982, the U.S. government reversed its earlier policy and sought to entice rocket makers back into the commercial launch business.[10] This effort culminated in congressional passage of the Commercial Space Launch Act (the "Space Act") in 1984.[11] The Space Act provided for insurance requirements,[12] the use of government launch facilities,[13] and licensing procedures.[14] Industry, however, remained largely uninterested, believing it imprudent to attempt to compete with the government-subsidized shuttle program.[15]

Arianespace's success in this environment was immediate and significant. In the early 1980s, Ariane rockets experienced few operational problems, and launch services customers turned away from NASA's more expensive Shuttle[16] to the Ariane ELV.[17] By 1985, Arianespace had an order book of 41 launches, nearly half of which were from non-European customers.[18]

In 1986, the *Challenger* disaster threw the U.S. space program — and

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AVIATION WK. & SPACE TECH., Feb. 15, 1988, at 51.

9. *See The Ariane Saga: Pushing the Envelope of Commercial Success*, VIA SATELLITE, Nov. 1993, at 4 (special supplement).

10. President Reagan initiated his National Space Policy in 1982, anticipating private sector participation in the development of launch vehicles. In 1983, the National Security Council issued a comprehensive policy for ELV commercialization. *See* Timothy A. Brooks, Comment, *Regulating International Trade in Launch Services*, HIGH TECH L.J. 59, 60-61 (1991).

11. Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055, *amended by* Commercial Space Launch Act Amendments of 1988, Pub. L. No. 100-657, 102 Stat. 3900 (codified as amended at 49 U.S.C. §§ 2601-2623 (1988)). The Space Act codified an earlier executive order that had made the Office of Commercial Space Transportation the lead agency in coordinating regulatory affairs concerning private industry.

12. 49 U.S.C. § 2615 (1988). As will be discussed *infra*, a large area of concern for launch companies is liability for accidents.

13. *Id.* § 2614.

14. *Id.* §§ 2605-2613.

15. *See* Henry R. Hertzfeld, *Economic, Market, and Policy Issues of International Launch Vehicle Competition*, *in* INTERNATIONAL SPACE POLICY: LEGAL, ECONOMIC AND STRATEGIC OPTIONS FOR THE TWENTIETH CENTURY AND BEYOND 203, 214 (Daniel S. Papp & John R. McIntyre eds., 1987) [hereinafter Papp & McIntyre].

16. Shuttle launches were significantly more expensive than Ariane launches. In fact, even NASA's heavy subsidization of costs made the Shuttle only a marginally viable commercial operation. *See* Reynolds & Merges, *supra* note 5, at 14-15.

17. *See* Heydon, *supra* note 4, at 140.

18. *Id.*

the launch services market — into complete disarray.[19] Earlier policy choices that had discouraged ELV manufacturers from joining the commercial launch business left the United States without a usable launch capacity other than the Shuttle.[20] With the Shuttle grounded, the U.S. launch sector was too.

The *Challenger* disaster prompted a thorough reexamination of U.S. space policy.[21] Within six months, the President completely removed the Shuttle program from the commercial satellite launch business[22] to encourage domestic ELV manufacture. Combined with substantial excess demand for launches,[23] this step ultimately persuaded U.S. manufacturers to reenter the commercial space launch business. By this time, however, Arianespace had made considerable inroads on U.S. market share — lost ground that the United States launch companies will likely never make-up.

B. The Current Market

1. Demand for GEO Satellite Launches

If there is one constant in the various estimates about future demand for GEO launches, it is that demand will remain relatively flat for the next ten years. Arianespace projected in early 1992 that between 120 and 150 satellites would be launched between 1992 and the year 2000.[24] These figures are consistent with other estimates.[25] Various market

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19. *See, e.g.*, *America Grounded*, NEWSWEEK, Aug. 17, 1987, at 34-42. Substantial controversy regarding NASA's internal administration and the general direction of U.S. space policy followed the *Challenger* accident. *See* Reynolds & Merges, *supra* note 5, at 16.

20. *See supra* notes 7-8 and accompanying text.

21. *See, e.g.*, James Fallows, *The Americans in Space*, N.Y. REV. OF BOOKS, Dec. 18, 1986, at 34.

22. *See* 22 WKLY. COMP. PRES. DOC. 1103 (1986).

23. Several ELV launches failed in late 1985 and early 1986, exacerbating the impact of the *Challenger* incident. *See* Heydon, *supra* note 4, at 140. This demonstrates a point occasionally ignored in market analyses: the small supply base makes the market equilibrium extremely volatile. This market "thinness" arguably justifies an oversupply of launch providers. *See, e.g.*, *Hearings Before the Subcomm. on Trade of the House Comm. on Ways and Means*, 102d Cong., 2d Sess. 1 (1992) (prepared statement of Alan M. Lovelace, General Dynamics Corp.) [hereinafter *Trade Hearings*].

24. *See Market Trends*, ARIANESPACE NEWSLETTER (1992).

25. *See Upfront*, SATELLITE COMM., Dec. 1993, at 25 (Interview with Sam Mihara of McDonnell Douglas Space Systems). Euroconsult, a European consulting firm, has mzde similar estimates for roughly the same period. *See Business As Usual*, THE ECONOMIST, June 15, 1991, at 8 (special supplement). The Congressional Budget Office's ("CBO")

observers have also made estimates about how demand will vary over the short, medium, and long term. These estimates are summarized and presented in Table 1.

TABLE 1: ESTIMATED DEMAND FOR GTO LAUNCHES 1994-2003[26]

Period	*Demand Per Year*
Short-term (1994-1996)	21-23 Satellites
Medium-term (1997-2000)	16-18 Satellites
Long-term (2001-2003)	17-19 Satellites

Demand in the short-term will be fueled by European transponder[27] needs, requiring the addition of tne to fifteen satellites over the next few years.[28] The United States will also be a source of near-term demand because nearly two-thirds of the satellites presently in service need replacing.[29] Demand from the rest of the world will be led by the Asian and Pacific markets, which are presently underserved by transponder capacity.[30] Many of these countries are developing satellite communications systems, and deregulation of Asian telecommunications markets will likewise spur new demand. Australia, India, Indonesia, Japan, Korea, Malaysia, and Thailand have all ordered or recently taken delivery of satellites. Finally, the international operators Intelsat and Inmarsat[31] plan to launch several satellites in the coming decade, and their policies of

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figures are also in this range. *See* CONGRESSIONAL BUDGET OFFICE, ENCOURAGING PRIVATE INVESTMENT IN SPACE ACTIVITIES 32 (Feb. 1991) [hereinafter ENCOURAGING PRIVATE INVESTMENT].

26. *Id. See also SCUC Speakers Forecast Fewer Launch Contracts, More Players*, SATELLITE NEWS, Oct. 18, 1993, at 6; *The World Market for Commercial Launch Services*, VIA SATELLITE, Nov. 1993, at 17-18 (special supplement); *Hearings Before the Subcomm. on Space of the Comm. on Science, Space, and Technology*, 103d Cong., 1st Sess. 15 (1993) (prepared statement of Peter F. Allgeir, Office of the U.S. Trade Representative ("USTR")) [hereinafter *Space Hearings*].

27. A transponder is the heart of a communications satellite that ferries a signal from one ground user to the next. *See* NATHAN C. GOLDMAN, SPACE POLICY: AN INTRODUCTION 155-174 (1992).

28. *See Market Trends*, *supra* note 24.

29. *See id.*

30. *See Special Report — Satellite Competition Heating Up in Europe, Asia*, SATELLITE NEWS, Mar. 16, 1992, at 4.

31. These two groups are international corporations which provide satellite services for consumers around the globe. *See generally* NATHAN C. GOLDMAN, AMERICAN SPACE LAW 52-62 (1988).

diversifying acquisitions will spread business throughout the industry.[32]

In the medium and long term, the demand prospects are not nearly so bright. First, built-up demand stemming from the *Challenger* disaster will soon begin to taper off.[33] Second, after the near-term surge in transponder requirements, the world's appetite for transponder capacity will be satisfied and demand will mainly be for "maintenance" of that level.[34] Third, competition for transponders from fiber-optic cables will become increasingly fierce, as prices drop and technology improves.[35]

2. *Current, World-Wide Launch Capacity*

a. *Western Launchers*

The three established Western companies in the commercial launch services business are Arianespace, Martin-Marietta, and McDonnell Douglas.[36] Each provides relatively similar services for GEO launches.[37] In addition, Japan has recently launched a rocket, although it has not yet garnered any commercial contracts.[38] Rocket production capacity and launch site availability are the two most important limits on launch

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32. *See* Daniel Green & Yvonne Preston, *Rocket Failure Cuts China's Space Edge*, FIN. TIMES, Mar. 24, 1992, at 4.

33. *See SCUC Speakers Forecast Fewer Launch Contracts, More Players*, *supra* note 26, at 6.

34. Newer satellites have longer anticipated lifetimes than the ones they have replaced or will replace; digital video compression technology will also likely result in diminished demand pressure. *See* Philip Chien, *Satellite and Launching Trends: 36 Years of Activity*, VIA SATELLITE, Jan. 1994, at 34.

35. Fiber-optic cable can provide substantial capacity and superior service to satellite technology (which requires a delay in voice and data communications between each transmission). Although capital investment costs for fiber-optic cable are extremely high, the service is becoming increasingly competitive with satellite communications. *See generally* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 31; *Undersea Cable Pressuring Satellite Providers in Global Markets*, GLOBAL TELECOM REPORT, Sept. 24, 1992.

36. Martin Marietta purchased the Centaur and Atlas assets of General Dynamics in late 1993. *See Martin Marietta Corp. to Purchase GD Atlas-Centaur Business*, SATELLITE NEWS, Oct. 11, 1993, at 1. Lockheed markets the Russian booster, the Proton, as part of a joint venture. *See infra* note 61 and accompanying text. Martin Marietta does not actively promote its Titan launcher for commercial purposes because its high capacity makes it uneconomical for most commercial payloads. Martin Marietta also has a large order book of military contracts. *See The Moon is Made of Gold*, THE ECONOMIST, June 15, 1991, at 6.

37. *But see* discussion *infra* part II.B., which compares non-price attributes of different launch providers.

38. *See infra* notes 80-85 and accompanying text.

capacity.[39] Table 2 summarizes short-term Western commercial launch services capacity.

TABLE 2: PRESENT WESTERN COMMERCIAL LAUNCH SERVICES CAPACITY[40]

Launch Provider	*Launch Capacity per year*	*Satellite Capacity per year*
Arianespace (Europe)	8-10	12-16*
Martin Marietta (U.S.)	6	3-6
McDonnell Douglas (U.S.)	4-6	4-6
NASDA (Japan)**	0-2	0-2
Total	18-24	19-30

* The wide range results from the Ariane rockets' ability to ferry one, two, or even three satellites per launch, depending on size. The numbers provided here are likely estimates given probable payload sizes and market segmentation.

** Japan's capacity is too expensive at present to be considered immediately "available" for commercial contracts, although this may change in coming years.

Turning first to Europe, Arianespace has exclusive use of its launch facility in French Guiana[41] and has planned a production rate of eight to ten launchers per year.[42] The Ariane 4 rocket can carry either two small

39. Short-term, unmet demand is an insufficient enticement for producers to increase substantially their production capacity or for new firms to enter the market because the investment costs are too great, given the associated risks. *See Space Hearings*, *supra* note 26, at 136-37 (prepared statement of Rex R. Hollis, Space Systems/Loral).

40. This table does not include capacity from the Proton launchers marketed by Lockheed. These figures are based on early 1992 estimates by Arianespace, an analysis of the commercial launch contracts worldwide, and figures from the U.S. Department of Commerce, Office of Space Commerce. *See* Arianespace launch manifest, June 1993 (available from Arianespace and on file with author); *Market Trends*, *supra* note 24; DEPARTMENT OF COMMERCE, SPACE BUSINESS INDICATORS 45 (June 1992) [hereinafter SPACE BUSINESS INDICATORS]; ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 27-28; Peter B. de Selding, *Launch Market Prepares for Business War*, SPACE NEWS, Mar. 7-13, 1994, at 8; *SCUC Speakers Forecast Fewer Launch Contracts, More Players*, *supra* note 26, at 6.

41. The launch facility has a recovery time that limits the maximum number of launches to roughly 11 over the course of any 12-month period. *See Market Trends*, *supra* note 24.

42. *See SCUC Speakers Forecast Fewer Launch Contracts, More Players*, *supra* note 26, at 6; *Arianespace to Modify Troubled Third Stage; Delays Expected*, SATELLITE NEWS, Feb. 21, 1994, at 2; *The World Market for Commercial Launch Services*, VIA SATELLITE, Nov. 1993 at 17 (special supplement).

to medium-sized satellites or one larger satellite.[43] The Ariane 5 rocket, which should become available on a commercial basis in 1996, has even greater capacity.[44] Arianespace therefore has an estimated average capacity of roughly twelve to sixteen satellites per year, with this number increasing in the next few years.[45] Martin-Marietta's commercial order book indicates that it will proceed with roughly three to six launches per year.[46] McDonnell Douglas can reasonably expect to supply four to six commercial launches per year in the coming decade.[47]

b. China

The Chinese state-owned launch company, Great Wall Industry Company ("GWIC"), currently produces two rockets, the Long March 3 (3100 lbs. to GTO) and the Long March 2E (6900 lbs. to GTO).[48] China joined the commercial launch services business in 1987.[49] Its progress has since been uneven. In April 1992, Beijing announced a $60 million contract to launch an American-made satellite for Intelsat in the mid-1990s.[50] In late 1993, China also signed contracts to launch two additional satellites in the mid-1990s for a U.S. company.[51]

Despite these advances, however, the impact of Chinese launchers on the market, at least in the short-term, remains uncertain. There were no successful Chinese launches in 1991, and two failures in 1992.[52] This

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43. *See* SPACE BUSINESS INDICATORS, *supra* note 40, at 43.

44. *See infra* Table 4.

45. The increasing size of telecommunication satellites will, to some extent, offset the greater payload capacity of the Ariane 5. *See* de Selding, *supra* note 40, at 8.

46. *See* Carissa Bryce Christensen & Joel S. Greenberg, *The Commercial Launch Industry: Will It Fly on Its Own?*, AEROSPACE AMERICA, May 1992, at 32; *see also A Strong Finish for 1993; 1994 Launch Preview*, VIA SATELLITE, Dec. 1993, at 122. The CBO confirms an expected 4-5 launches per year for General Dynamics. ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 15.

47. *See id.*; *see also* SPACE BUSINESS INDICATORS, *supra* note 40, at 18, 22-24.

48. *See* de Selding, *supra* note 40, at 8; ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 18. Additional rockets with a greater payload capacity are under development. *See* de Selding, *supra* note 40, at 8; Andrew Lawler, *Chinese Ready Series of New Launch Vehicles*, SPACE NEWS, Jan. 24-30, 1994, at 1, 28.

49. *See* Green & Preston, *supra* note 32, at 4.

50. *See* James L. Tyson, *China's Manned Space Program Seen as a Bid to Shore Up Image*, CHRISTIAN SCI. MONITOR, May 8, 1992, at 7.

51. *See Western Launchers Experience Increased Pressures from the East*, SATELLITE NEWS, Oct. 4, 1993, at 1.

52. *See* Green & Preston, *supra* note 32, at 4. A March 1992 failure was followed by a successful launch in August of the same year. Daniel Green & Yvonne Preston, *China Launches Into Space Market*, FIN. TIMES, Aug. 16, 1992, at 3. Unfortunately for GWIC, there was another failure in December 1992 which resulted in the loss of a $138 million

string of unsuccessful attempts has caused some to question China's reliability as a launch services provider.[53] A U.S.-China memorandum of understanding also limits the number of launches China can conduct through the end of 1994 to two.[54] At this writing, there are few signs that the U.S.-China agreement will be renewed.[55] Two temporary suspensions of all satellite export licenses[56] have, at various points, also made users uncertain about their ability to obtain satellite export licenses.[57] These uncertainties may diminish China's attractiveness as a launch provider despite the bargain prices offered by GWIC.

However, China will still likely emerge as a competitor in the launch services market. U.S. satellite export controls will not serve as an effective weapon over the long term,[58] and short-term concerns about reliability will wane, assuming GWIC enjoys some launch successes. Ultimately, GWIC's extremely low prices[59] will force customers to consider China when seeking a launch services provider.

Because of these factors, the number of satellite launches that the Chinese will contribute to the international capacity will probably be anywhere from zero to a maximum of two launches per year through the

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Hughes satellite. *See Hughes Still Confident in China Satellite Launch*, REUTER BUSINESS REPORT, Apr. 8, 1993, *available in* LEXIS, News Library, Curnws File.

53. *See Western Launchers Experience Increased Pressures from the East*, *supra* note 51, at 1; Tyson, *supra* note 50, at 7; Christensen & Greenberg, *supra* note 46, at 32.

54. The U.S.-China Agreement is discussed more fully *infra* part II.C.3.

55. U.S.-China relations have been particularly discordant in 1994, owing in part to the debate over renewal of China's most-favored-nation ("MFN") trading status. *See generally* Robert S. Greenberger, *Cacophony of Voices Drowns Out Message from U.S. to China*, WALL ST. J., Mar. 22, 1994, at A1.

56. After the Tiananmen Square incident, all satellite export licenses were temporarily suspended. Likewise, restrictions on the transfer of high-technology equipment (including satellites) were adopted after the U.S. government concluded that China had violated the Missile Technology Control Regime ("MTCR"). *See Satellite Industry Supports Proposed Lifting of Sanctions Against China*, COMMUNICATIONS DAILY, Nov. 15, 1993, at 5; *U.S. Approves Chinese Launch of American-Made Satellites*, COMMUNICATIONS DAILY, Sept. 16, 1992, at 2; *Bush Bars Satellite Exports to China, Cites Munitions List, Foreign Aid Law*, COMM. DAILY, May 2, 1991, at 3.

57. *U.S. Satellite Launch Industry Accuses Peking of Violating Accord*, CENTRAL NEWS AGENCY, Apr. 3, 1992, *available in* LEXIS, News Library, Curnws File.

58. *See infra* note 162 and accompanying text.

59. Chinese launches have generally been priced at about $30-40 million each, less than most Western bids. *See* Green & Preston, *supra* note 52, at 3. The Chinese bid in a recent INTELSAT competition was closer to those of Western competitors. Several observers have speculated that the higher than usual bid was aimed at reducing tension over Chinese participation in the launch services market. *See Arianespace Selected for Intelsat 8 Deal*, FLIGHT INT'L, Dec. 16, 1992. Whether this bid indicates a trend toward matching Western prices is unclear, although there is substantial reason for skepticism given the pending expiration of the U.S.-China Memorandum of Understanding.

end of the decade.

c. Russia

The Soviets have launched over 2000 spacecraft with mass-produced, highly reliable rockets.[60] Russia inherited most of the space assets of the Soviet Union, and it has maintained a keen interest in entering the commercial space industry.[61] As yet, however, neither Russia nor any of the republics has launched an American-built satellite because of export licensing restrictions.[62] This fact has limited Russia's ability, until recently, to compete in the international launch services market because the vast majority of commercial satellites are American-made.[63] Most non-American satellites are European and ordinarily fly on Ariane rockets.

Russia's potential entry into the commercial launch services market could dramatically alter the supply-demand relationship. One American

60. *See There and Back Again*, THE ECONOMIST, June 15, 1991, at 10 (special supplement). In fact, the CBO has suggested that its experience and massive economies of scale may make Russia the low-cost provider of launch services. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 37.

61. Consider President Yeltsin's visit to the United States in 1992, during which he promoted Russian space technology for sale to the United States. *See, e.g.*, James R. Asker, *U.S., Russian Space Pact Pledges Unprecedented Trade, Joint Flights*, AVIATION WK. & SPACE TECH., June 22, 1992, at 24. Russia is eager to exploit one the few areas in which it has advanced technology that could compete with the West and earn hard currency for the beleaguered Russian economy. Glavkosmos, the Russian space agency, and DB Salyut, a rocket marketing agency, have eagerly sought to enter the commercial space market. Most notably, the U.S. firm Lockheed signed a deal in late 1992 with Russia's Khrunichev Enterprises to market in the West the Proton booster. *See* David J. Jefferson, *Lockheed and Russia's Khrunichev Form Commercial Satellite Launch Venture*, WALL ST. J., Dec. 29, 1992, at A3; *Lockheed-Khrunichev Deal Includes Proton Boost for Motorola*, SATELLITE WK., Mar. 15, 1993, *available in* LEXIS, News Library, Curnws File.

62. The Arms Export Control Act ("AECA") authorizes the President to control the export of defense articles and services. 22 U.S.C. § 2778 (1989 & Supp. 1990). Implementing this mandate is the responsibility of the Secretary of State, who promulgates the International Traffic in Arms Regulations ("ITAR"). 22 C.F.R. §§ 120-30 (Apr. 1993). Included in the ITAR is the U.S. Munitions List ("USML"), which lists items that cannot be exported without a license. *See* 22 C.F.R. §§ 121.1, 123.1 (Apr. 1993). Until recently, satellites were included in the USML. *See* 22 C.F.R. § 121.1 (Apr. 1993). Satellites are presently included in the Commerce Control List ("CCL"). 22 C.F.R. § 799 (Jan. 1993).

63. *See* SPACE BUSINESS INDUSTRY, *supra* note 40, at 3. The long-term efficacy of export regulations as a means of limiting competition in the launch services market is questionable, however. Non-U.S. satellite makers could potentially use the opportunity to gain market share. Indeed, Russia itself may soon provide the world with communications satellites. In a surprising break with precedent, Intelsat recently agreed to lease capacity on some Russian satellites. *See Intelsat to Lease 3 New-Generation Russian Satellites*, SATELLITE WK., Mar. 22, 1993, *available in* LEXIS, News Library, Curnws File.

aerospace executive has estimated that Russian capacity represents ten times current world market needs.[64] This estimate may include some optimistic political and technical assumptions, but even more conservative projections indicate that Russia could contribute capacity of up to 100 satellites per year.[65]

It is thus hardly surprising that U.S. launch companies and Arianespace reacted swiftly and strongly to President Bush's agreement at the June 1992 Summit to permit Russian bidding on an Inmarsat III launch.[66] The summit agreement was followed by negotiations regarding the entry of Russia into the launch services market. These talks culminated in an agreement signed in September 1993.[67] The agreement is similar in form to the U.S.-China accord. It limits to eight the number of launch contracts[68] into which all Russian launch providers can enter with international customers during the period of the agreement (through December 31, 2000).[69] No more than two launches may be conducted during any twelve month period.[70] The provisions with respect to pricing[71] provide that if a Russian bid is more than 7.5% lower than the

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64. Statement of Chris N. Clawson, McDonnell Douglas Corporation (transcript on file with author).

65. *See* Mikhail Sergeyev, *Protons Will Promote Russia to World Aerospace Market*, RUSDAT -BIZEKON NEWS, Jan. 12, 1993, *available in* LEXIS, News Library, Curnws File.

66. U.S. approval for a Russian bid was required because the satellite was American-made and required an export license for a foreign launch. *See* Asker, *supra* note 61.

As a practical matter, because Inmarsat has a policy of spreading launch contracts around to different nations, it is improbable that an American company would have won the competition for Inmarsat III. In fact, Russia winning this contract may actually help American launchers because Arianespace would be the likely alternative to Russia. Telephone interview with Casey Anderson, formerly of AIR FORCE TIMES (Jan. 30, 1993).

67. *See* 59 Fed. Reg. 11,360 (1994).

68. The focus on contracts rather than launches assures greater consistency in market capacity because Russia is not permitted to make contracts for launches that would occur after the expiration of the agreement.

69. The eight contract limit excludes the Inmarsat III launch. *See* 59 Fed. Reg. 11,361 (1994). The limit also pertains only to "principal payloads." *Id.* Some interpretive difficulties have arisen in connection with which launch contracts are to be counted. *See generally* Andrew Lawler, *Russia Protests Launch Guidelines*, SPACE NEWS, April 11-17, 1994, at 3, 29; *U.S. and Russian Representatives Discuss Commercial Launch Pact*, SATELLITE NEWS, April 11, 1994, at 1-3.

70. *See* 59 Fed. Reg. 11,361 (1994).

71. Given Russia's past pricing practices — its bid of $36 million for one Intelsat contract was far below competing bids — such provisions were thought to be essential. *See U.S. Commercial Launch Industry Needs Protection*, SATELLITE NEWS, Dec. 14, 1992, *available in* LEXIS, News Library, Curnws File; *see also Russia's Proton Rocket Chosen for Inmarsat III Launch*, MOBILE SATELLITE RPTS., Nov. 23, 1992, *available in* LEXIS, News Library, Curnws File. Intelsat claims that interface costs, insurance, and management expenses will raise the cost to the $50 to $100 million range (near Western bids, which included a $62 million bid by Arianespace). *See* Daniel Green, *Flying Start for Russian*

lowest market-economy bid, Russia must show, in special consultations with the United States, that its bid conforms to the principles of the agreement.[72]

The Europeans have negotiated a similar, if not more restrictive agreement with the Russians.[73] At this writing, the effective date of that agreement was unknown due to ratification difficulties in the Russian Parliament.[74] In any event, the U.S.-Russian accord indicates that Russia's participation in the launch services market over the short-term will be limited. In fact, it appears that the limit on contracts has already been reached.[75] Other barriers, such as internal political developments,[76] and uncertainty regarding satellite export licenses will also diminish the impact of Russia's initial market entry.[77] Thus, despite some successes — Russia struck a deal in January 1993 with Motorola for three LEO launches on the Proton[78] — Russia's impact on the commercial GEO market has been limited to this point, and will likely remain so for the rest of the decade.[79]

d. Japan

Japan has not yet entered the commercial launch services market, although its newly developed booster, the H-2, recently completed a successful maiden voyage.[80]

The commercial impact of the H-2 will likely be minimal. The rocket was originally scheduled to fly in 1991, but this date was repeatedly

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Satellite Industry, FIN. TIMES, Nov. 18, 1992, at 4.

72. Green, *supra* note 71, at 4.

73. *See* Peter B. de Selding, *Russian Lawmakers Stall Satellite Accord*, SPACE NEWS, Apr. 11-17, 1994, at 1, 28.

74. *Id.*

75. *See Launch Deal Puts Lockheed-Russia Venture Over $600 Million*, SATELLITE NEWS, Mar. 21, 1994, at 6.

76. *See, e.g.*, *Moscow Meeting Offers No Solution to Cosmodrome Feud*, SATELLITE NEWS, Feb. 28, 1994, at 6; Christensen & Greenberg, *supra* note 46, at 32; *see also* Craig Covault, AVIATION WK. & SPACE TECH., Feb. 1, 1993, at 57 (discussing civilian-military tension over the Russian space program and other possible threats to its stability from Russian-Khazak friction).

77. Russia's evolving indigenous satellite capability makes export controls at best a temporary barrier to market entry.

78. The Motorola arrangement apparently has the initial approval of the U.S. Government. *See* Andrew Lawler, *supra* note 69.

79. *See* de Selding, *supra* note 40.

80. *See* Norri Kageki, *H-II Launch Puts Japan in Space Race*, NIKKEI WKLY., Feb. 7, 1994, at 1.

moved back because of technical problems.[81] Japan also has only a brief, biannual launch window because of an agreement with Japanese fishermen regulating use of the country's one launch site.[82] This narrow launch window makes each delay a significant setback and will also limit the number of launches Japan will ultimately add to world wide market capacity.

It also remains to be seen how aggressively the Japanese will pursue the market for commercial launch services. Some industry observers suggest that Japan will move aggressively into the market.[83] This effort, however, will not likely offset other disadvantages that the Japanese face. Most importantly, the H-2 will likely cost substantially more than all of its competitors by the time it comes to market.[84] NASDA apparently still intends to service Japanese public demand and in any event will at least test the commercial waters.[85] Thus, the Japanese will probably supply one or two launches per year over the medium to long term.

e. India

Although it does not yet possess a rocket capable of placing a satellite in GEO orbit, the Indian Space Research Organization ("ISRO") has continued to modify its GSLV launcher to prepare for entry into this market.[86] Optimistic assumptions place the first GTO launch of the GSLV sometime in 1996.[87] If current estimates are correct, the GSLV should carry a "per pound to GTO" price tag substantially lower than those of current market participants.[88] Whether this timetable and price forecast are correct will likely remain uncertain for the immediate future; the extent of India's eventual contribution to satellite lift capacity is also unclear. India's potential presence, however, could mean even greater

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81. *See* Andrew Lawler, *NASDA Readies H-2 Rocket for Maiden Flight*, SPACE NEWS, Jan. 17-23, 1994, at 3, 21.

82. *See H-2 Commercial Use Limited by High Costs*, AVIATION WK. & SPACE TECH., Jan. 31, 1994, at 52.

83. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 26.

84. *See* Kageki, *supra* note 80, at 8; *H-2 Commercial Use Limited By High Costs*, *supra* note 82.

85. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 26. One option would be for NASDA to cooperate with McDonnell Douglas to provide a second stage for the Delta II. *Id.*

86. *See India Forges Ahead with PSLV/GSLV Family of Launch Vehicles*, SATELLITE NEWS, Apr. 11, 1994, at 5.

87. *Id.*

88. *Id.*

world wide capacity and additional downward pressure on launch prices.

3. *Comparing Supply and Demand*

As the above discussion indicates, short term capacity will come almost exclusively from Arianespace, Martin Marietta, and McDonnell Douglas, with China and Russia each adding a couple of launches. Japan and India may enter the market at a competitive level in the medium term. Japan will also absorb some Japanese public sector launches before it begins to compete commercially. Table 3 summarizes the situation.

TABLE 3: ESTIMATED CAPACITY FOR LAUNCH SERVICES*

	GTO Satellite Launch Capacity (per year)		
Supplier	*Short Term 1994-1996*	*Medium Term 1997-2000*	*Long Term 2001-2003*
Arianespace (Europe)	12-16	11-12	11-12
Martin Marietta (U.S.)	3-6	3-6	3-6
McDonnell Douglas (U.S.)	4-6	4-6	4-6
GWIC** (China)	1-2	1-2	1-2
Glavkosmos** (Russia)	0	1-2	1-2
NASDA** (Japan)	0	1-2	2
ISRO** (India)	0	?	?
Total Supply	20-30	21-30	20-30
Estimated Demand	21-23	16-18	17-19
Excess Capacity	(1)-7	5-12	3-11

* Includes political as well as economic and technical constraints.

** Highly uncertain.

As this table demonstrates, under all but the most optimistic scenarios, excess capacity is already a problem in the launch services industry. This excess capacity will be exacerbated in the medium term as demand slackens and additional players enter the launch services business. Absent some dramatic change in circumstances, U.S. suppliers will likely not garner sufficient market share to operate at full or even near-full capacity.[89] These data also reveal the relative volatility of the launch services market; the small size makes each launch relatively important in terms of capacity. With launch success rates generally exceeding ninety percent,[90] failures should not present any difficulties. Nonetheless, these figures for capacity are most properly understood as averages.[91]

C. The View from Users: Satellite Manufacturers and Telecommunications Companies

In the early 1990s, demand for satellite services surged at the same time that a combination of failed launches and other unforeseen circumstances reduced the available payload slots, leaving some demand unmet.[92] This market thinness makes many consumers of launch services interested in raising, rather than limiting, capacity.[93]

As for 1994 and beyond, users are a bit uncertain regarding the level of demand. As Arianespace noted in 1992, "[i]n the space sector, it is always difficult to anticipate, even for the short term."[94] Satellite users have no monopoly on predictive ability in this area, but there is an apparent sense among many that launch services capacity is insufficiently responsive to customers' needs.[95] This is certainly not a consensus view in the industry, and at least one satellite manufacturer, Hughes, estimates a much softer market.[96]

Whatever the actual result, users would like to see greater launch capability and capacity. The launch services market is insufficiently developed at present to provide much confidence to end users, who must plan for the future. Instead, the risk of failures and the thinness of the

89. Instead, launch contracts will likely go to more competitive suppliers.

90. *See* SPACE BUSINESS INDICATORS, *supra* note 40, at 18-21, 43; *Market Trends*, *supra* note 24.

91. Launch failures can restrict capacity at any time, as shown by the failure of the Ariane 4 in 1990. Arianespace had planned nine launches for 1990 but only executed six. Later, in early 1994, another Ariane rocket failed, throwing the launch manifest into disarray. *Arianespace to Modify Troublesome Third Stage; Delays Expected*, SATELLITE NEWS, Feb. 21, 1994, at 1.

92. *See Market Trends*, *supra* note 24.

93. *Space Hearings*, *supra* note 26, at 140 (prepared statement of Rex R. Hollis, Space Systems/Loral).

94. *See Market Trends*, *supra* note 24.

95. According to one media report, "operators of satellite services are desperate to maintain or raise the number of launch suppliers." Green & Preston, *supra* note 32.

96. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 24, at 36.

market make planning a difficult task. Users would also like to see greater capacity because of the favorable impact on prices. In particular, launch service customers eagerly await the addition of new suppliers hoping to gain toeholds in the market with low introductory prices.[97] Some satellite manufacturers have strongly advocated an open access policy to different launch suppliers,[98] contending that open access is a key element of remaining competitive in the international market for satellites.[99] In assessing strategies to assist domestic launch providers, the needs and interests of customers must be kept in mind.

The preceding should make it clear that U.S. launch services suppliers face a fiercely competitive decade in which marginally competitive firms will likely lose most or all of their market share. As new suppliers come on line in the middle to late 1990s, tremendous downward pressure will be exerted on prices. The next part explores whether this means the end of commercially viable U.S. launch services companies.

II. THE DETERMINANTS OF COMPETITION

A. *Mechanics of Commercial Launch Services Contracts*

Launch services contracts often call for delivery of a satellite into orbit. This requires the satellite manufacturer to secure the launch services from the rocket maker, which, in turn, contracts with the government to use public launch facilities and also acquires the requisite insurance.[100]

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97. For example, China's first commercial launch bid was about one half of Western bids. *See* Green & Preston, *supra* note 52. Russia's Inmarsat bid was likewise well below market price. *Russia's Proton Rocket Chosen for Inmarsat III Launch*, MOBILE SATELLITE REPT., Nov. 23, 1992, *available in* LEXIS, News Library, Curnws File.

98. *See, e.g.*, *Space Hearings*, *supra* note 26, at 140 (prepared statement of Rex R. Hollis, Space Systems/Loral); James R. Asker, *U.S. Approval of Satellite Launches by China Not the End of Sanctions*, AVIATION WK. & SPACE TECH., Jan. 1, 1990, at 40.

99. U.S. satellite manufacturers face a real threat from foreign competitors. *See* Joseph N. Pelton & Barton Edelson, *The Race is On: Stiff Competition for U.S. Communications Satellite Industry in Global Market*, SATELLITE COMM., Mar. 1993, at 30.

100. Insurance usually includes coverage for loss of vehicle and payload, damage to government launch facilities, and third party liability. The amount of insurance required for third party liability and government property damage is determined by the Secretary of Transportation. *See* 49 U.S.C. § 2615 (1989 & Supp. 1990). Insurance rates for satellites usually are 15-20 percent of payload value. *See* Daniel Green, *Flying Start for Russia's Satellite Launch Industry*, FIN. TIMES, Nov. 18, 1992, at 4. A recent estimate puts the average cost of insurance at 17% of total mission cost. *See* Jeffrey M. Lenorovitz, *Arianespace Seeks Cut in Launch Insurance Rates*, AVIATION WK. & SPACE TECH., Oct.

B. Non-Price Considerations in Choosing a Launch Company

Several factors other than price[101] figure into the award of satellite launch contracts.[102] Launch services are differentiated based on their ability to lift weight into a specific orbit,[103] reliability,[104] schedule flexibility,[105] insurance costs,[106] and, occasionally, technical considerations[107] or previous dealings between the interested parties.[108] The most important of these factors, however, is the launcher's payload capacity, broken down by supplier in Table 4.

19, 1992, at 88. The amount of coverage available for a typical launch is roughly $250 million. *Id.* Recent launch failures may have altered these figures.

101. Average prices for current market suppliers are roughly equal on a per kilogram basis, with the Chinese coming in at the lower end of the market. Because marginal costs of a launch are largely inelastic as to payload weight, the market (thin though it is) is segmented, as users attempt to fill the capacity of a rocket to get the best per kilogram price. *See* de Selding, *supra* note 40.

102. This view is disputed by some writers who claim that competition centers on costs, rather than ancillary services or quality. *See, e.g.*, Reynolds & Merges, *supra* note 5, at 23. The better view is that customers "seek the package of attributes that best achieves their objectives. Assessments of competitiveness must thus take into account not only price but also the attributes offered and the customer's objectives." Christensen & Greenberg, *supra* note 46, at 32. The latter view is also borne out by the history of contract awards, which usually, but not always, go to the lowest bidder.

103. For example, McDonnell Douglas did not compete for the launch of Intelsat 8 because the Delta rocket has too small a payload capacity.

104. For example, China's reliability record is dramatically less impressive than that of Arianespace, which has had only one failure in the past 27 launches. *See Ariane 4 Launch Disaster Blamed on Overheated Bearing*, SATELLITE NEWS, Jan. 31, 1994, at 1. Perhaps too optimistically, Arianespace's Charles Bigot has claimed that customers will move cautiously before embracing Chinese and Russian launch services. *See Western Launchers Experience Increased Pressure from the East*, *supra* note 51, at 1-3.

105. A McDonnell Douglas official recently claimed that a contract was awarded to her company for reasons of, inter alia, schedule flexibility. *See* Peter B. de Selding, *Arianespace Chief Criticizes Delta Prices*, SPACE NEWS, June 1-7, 1992, at 8.

106. Historically, launch insurance costs vary by only a few percent depending on the launch company. *See* Lenorovitz, *supra* note 100, at 88. More finely-tuned rates may become more common as reliability actually begins to vary substantially among suppliers. This would hurt the Chinese, aid Arianespace, and probably not significantly affect U.S. suppliers' rates. *Id.*

107. *See, e.g.*, de Selding, *supra* note 105, at 8.

108. *See* Heydon, *supra* note 4, at 141.

TABLE 4: PAYLOAD CAPACITIES[109]

Manufacturer	*Rocket*	*Payload to GTO*
Arianespace (Europe)	Ariane 4	9,800 lbs.
	Ariane 5	15,000 lbs.
General Dynamics (U.S.)	Atlas 2AS	8,200 lbs.
GWIC (China)	Long March 2E	6,900 lbs.
	Long March 3	3,100 lbs.
NASDA (Japan)	H-2	8,800 lbs.
Lockhard-Khrunichev (Russia)	Proton	5,700 lbs.*

* To GEO. Modifications to the Proton booster will increase its capacity.

This table provides some idea of how the market is segmented. For example, the Delta II's payload capacity is too small for many telecommunications satellites, whereas the Atlas is less economical for lighter loads.[110] The Ariane 4 uses a different design architecture which enables it to carry one large or two medium-sized satellites to GTO for a maximum payload of 9800 lbs.[111] Medium to larger-sized satellites are most easily accommodated on either the Ariane 4 or the Atlas 2. For smaller loads, the Delta II often competes with the Chinese Long March 3. Changes in launch services market capacity must therefore be considered in the context of this partial segmentation. This fact is often omitted from analyses of the market. With respect to GTO launches, the size of satellites seems to be increasing.[112] This has had two important impacts. First, the Ariane 4 is making fewer double payload launches, thereby decreasing its profitability.[113] Second, smaller payload rockets such as the Delta II risk being virtually excluded from the GTO launch

109. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 18; de Selding, *supra* note 40, at 8; Philip Chien, *A Strong Finish for 1993; 1994 Launch Preview*, VIA SATELLITE, Jan. 1994, at 122.

110. *See generally* Heydon, *supra* note 4, at 143; de Selding, *supra* note 40, at 8.

111. This dual-launch capability creates the incentive to fill each launch with two satellites, which sometimes results in a bargain price in order to fill the second slot. *See* Heydon, *supra* note 4, at 143. Dual launches, however, subject each customer to the possibility of delays caused by the co-passenger. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 14.

112. *See* de Selding, *supra* note 40, at 8.

113. *Id.*

market.[114]

Reliability rates are also an important factor in choosing a launch company. Because payloads are usually designed to customer specifications, a failure which destroys the payload can be disastrous for a customer, causing substantial delays in service to satellite users.[115] Moreover, there is a trend towards basing insurance rates on reliability. Scheduling flexibility and political factors can also be decisive in an otherwise equal competition.[116]

One final factor, often ignored in market surveys, is the effect of exchange-rate fluctuations.[117] These variations make launch suppliers with relatively constant pricing policies more or less attractive, depending on the prevailing exchange rates. For example, in the mid-1980s, when the dollar was riding high against most European currencies, American launch prices looked steep in comparison to prices offered by Arianespace. Conversely, by 1990, when the dollar had dropped significantly, Arianespace's relative price had risen dramatically.

C. *How Level a Playing Field: Trading Practices, Competitive Advantages, and Handicaps in the Launch Services Business*

This section canvasses the various economic and political factors that affect the different participants' competitiveness in the international market. An understanding of these factors must precede any assessment of the availability or desirability of trade remedies or industrial policy.

1. *Arianespace*

Arianespace is a mixed enterprise that includes private aerospace firms, banks, and the Centre National d'Etudes Spatiales ("CNES"), France's public space agency. Arianespace functions as a commercial provider — marketing services, procuring rocket components, and

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114. *Id.*

115. Consider, for example, the loss of a $138 million Hughes satellite in December 1992 when a Chinese rocket malfunctioned. *See Hughes Still Confident in China Satellite Launch*, *supra* note 52.

116. For example, Arianespace claims that the United States pressured Intelsat into accepting a Chinese bid with the tacit understanding that this would quell Chinese protest over the sale of F-16 fighter planes to Taiwan. *See* Green, *supra* note 100, at 4. General Dynamics has made similar assertions about Arianespace. *See Trade Hearings*, *supra* note 23, at 2 (prepared statement of Alan M. Lovelace, General Dynamics Corp.).

117. *See generally* Heydon, *supra* note 4, at 142.

assuming responsibility for launch operations.

Arianespace has enjoyed many competitive advantages as a result of support it receives from European governments. Direct subsidies were provided for the development of Ariane rockets, and the European Space Agency ("ESA") provides aid in such areas as failure analysis and correction of design deficiencies.[118] U.S. Government support in these areas ceased in 1987.[119] The complex web of relations among Arianespace and its owners creates several additional cost advantages. For example, ample room exists for shifting costs and expenses, opening the possibility of marginal subsidies in current operations. The multinational character of Arianespace's ownership and operations also offers an opportunity to exploit currency mixes in cost accounting and pricing.

As a government-industry partnership, Arianespace also avoids some of the difficulties that U.S. suppliers encounter. European government guarantees permit Arianespace to offer customers attractive financing.[120] Arianespace also uses its government contacts to assist customers in obtaining insurance.[121] Because it is a pseudo-private enterprise, Arianespace also gives priority for use of its launch tables to commercial customers. U.S. companies must use government launch sites, where commercial launches can be preempted by public sector scheduling.[122] In short, Arianespace is the beneficiary of much direct and indirect government support that lowers its costs and increases its attractiveness to potential customers. One slight disadvantage is that Arianespace's multinational character requires that it disperse its contracts among

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118. *Trade Hearings*, *supra* note 23, at 2 (prepared statement of Alan M. Lovelace, General Dynamics Corp.).

119. *Id.*

120. Arianespace offers European government financing guarantees to American satellite providers who sell their product to foreign companies for launch by Arianespace. *See* Brooks, *supra* note 10, at 69. U.S. launch companies do not have access to similar U.S. Government financing guarantees for sales to foreign companies for launches (on U.S. soil) by U.S. companies. *See, e.g.*, *Space Hearings*, *supra* note 26, at 113-14 (prepared statement of David W. Thompson, Orbital Sciences Corp.). American launch services companies have advocated that Eximbank financing be made available to purchasers of U.S.-made satellites who choose to launch with an American launch company. *See, e.g.*, *Industrial Base, AIA, Others Urge Changes in Policy Law to Promote Stable Aerospace Industry*, 59 Fed. Contracts Rep. 5 (BNA), at d5 (Feb. 5, 1993) [hereinafter *Industrial Base*]; *see also infra* note 254 and accompanying text.

121. These practices were at least in part responsible for a § 301 action filed against Arianespace. *See infra notes* 216-19 and accompanying text.

122. *See* Brooks, *supra* note 10, at 69. Because of the constraints on the use of current government launch sites, both Hawaii and Florida have considered building another launch facility for ELVs. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 15-16.

suppliers from different countries on the basis of a "fair return" for each, which is often inconsistent with minimizing costs.[123]

Some of Arianespace's advantages over its U.S. competitors are unrelated to government economic support. Although all boosters currently on the market were developed with government support, the Ariane rocket design and launch facilities are more modern than their American counterparts.[124] The launch facility in French Guiana is also closer to the equator than U.S. launch sites, making it more fuel efficient for rockets launched from this location.[125] ESA is also far ahead in the development of the next phase of ELVs. The Ariane 5 is due to fly commercially in 1996 and it will be able to launch up to three medium-sized telecommunications satellites.[126] By contrast, the U.S. cooperative venture to build the National Launch System ("NLS") faced various technical and funding delays that originally placed it far behind the European effort. Then, in late 1992, the NLS program was canceled.[127] Steady commercial demand has permitted Arianespace to order fifty Ariane 4 launchers in a single lot from European producers. The fifty-launcher purchasing commitment streamlined production processes and allowed Arianespace to reduce costs by twenty percent.[128] By making such a large order, Arianespace has effectively achieved the same

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123. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 23.

124. *See The Kourou Launch Facility*, VIA SATELLITE, Nov. 1993, Supp. at 10-11; *Space Hearings*, *supra* note 26, at 40 (prepared statement of Michael W. Wynne, General Dynamics Corp.). The present fleet of American launch vehicles is based on designs that were not created with an eye to economically efficient production or use. Although modifications have improved performance and cost efficiency, at least one reason that the U.S. launch fleet has begun to lag behind the competition relates to its older designs. *See generally* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 23.

125. The closer to the equator, the less fuel required to attain GTO and hence the greater the payload capacity. The location of Arianespace's facility provides it with roughly a 10% lift advantage. *See* SETTING SPACE TRANSPORTATION POLICY, *supra* note 4, at 30.

126. *See* Craig Covault, *European Ariane 5 Launcher Readied*, AVIATION WK. & SPACE TECH., Apr. 4, 1994, at 45-46. Some have questioned the ability of the Ariane 5 to find a commercial niche because its capacity is so great. Moreover, development costs for the vehicle and a new launch facility will probably run close to $5 billion; Arianespace's commercial revenues will not be able to cover this cost, thus requiring government subsidies. *See id.*; ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 23. Arianespace, however, is apparently confident of the impending need for a launcher with the Ariane 5's capability and believes it can recoup its investment in the vehicle. *See The World Market for Commercial Launch Services*, VIA SATELLITE, Nov. 1993, Supp at 20; Jeffrey M. Lenorovitz, *Ariane 5 Contractors Pressed to Reduce Recurring Costs*, AVIATION WK. & SPACE TECH., June 8, 1992, at 23.

127. For an account of the cancellation, see *Ambitious $10-15 Billion NLS System Canceled by Congress*, SATELLITE NEWS, Oct. 19, 1992, at 1.

128. *See* Jeffrey M. Lenorovitz, *Europe to Increase Emphasis on Commercial Space Activity*, AVIATION WK. & SPACE TECH., Mar. 16, 1992, at 128.

economies of scale that U.S. manufacturers accomplish through U.S. government contracts.

Direct ties between Arianespace and several European governments also raise questions of whether side conditions — for example, rocket technology transfers — are used to win launch contracts.[129]

As for the future, Arianespace's government support and cost efficiency will probably increase as Europe's manned space program comes under heightened pressure and European manufacturers shift emphasis to commercial space activities.[130]

2. *American Manufacturers*

American manufacturers have also benefitted from government largess.[131] Launch vehicle designs are the product of NASA and Defense Department-sponsored contracts.[132] The launch facility at Cape Canaveral is staffed by military personnel, and NASA pays most of the fixed costs,[133] while government insurance indemnification limits liability for accidents or damage to government property.[134] Some of this assistance has been sporadic, but there is little doubt that government participation has been essential to the development of the domestic commercial launch industry. Military purchases and "buy American" rules[135] for public sector satellite launches also provide a steady stream of business, which, as Table 5 indicates, nearly equals total commercial demand, and allows certain fixed costs to be amortized over a larger number of launch

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129. Some industry observers point to the case of Arianespace tying Brazil's decision to buy Ariane launches to the transfer of rocket engine technology from Europe to Brazil as an example of collateral influences on customer choices. See ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 23.

130. *Id.*

131. U.S. Government involvement in the space sector dates from the "space race" with the Soviet Union, which brought an enormous amount of technology under government control. *See generally What's a Heaven For*, *supra* note 25, at 4.

132. For example, the Delta rocket design is based on a 1950s missile produced by McDonnell Douglas for the U.S. military. *There and Back Again*, *supra* note 25, at 9.

133. *See Arianespace Chief Says U.S. Space Policy Protectionist*, AEROSPACE DAILY, Oct. 5, 1990, at 27.

134. In 1988, Congress amended The Commercial Space Launch Act of 1984 to provide insurance indemnification. Launch companies are liable for up to $100 million for damage to government property. They are required to obtain third party liability insurance coverage up to $500 million. The government will indemnify companies for any excess liability, up to $1.5 billion. *See* 49 U.S.C. § 2615 (1988).

135. Military contracts are a large portion of commercial launch providers' business. *See* Table 5. U.S. Government satellites are restricted to domestic carriers unless specifically exempted by the President. *See* Brooks, *supra* note 10, at 84.

contracts.

TABLE 5: LAUNCH CONSUMERS BY SECTOR[136]
Successful Launches 1990-1991

Civilian Supplier	*Commercial*	*Government*	*Military**
General Dynamics	5	1	3
McDonnell Douglas	5	1	7
Martin Marietta	1	0	4
Total	11	2	14

* Includes classified payloads.

This government support has not gone unnoticed. Charles Bigot of Arianespace is quick to counter charges of unfair competition by the Europeans by referencing U.S. government support for its launch industry.[137] Bigot has long maintained that a steady supply of launch business from the U.S. government subsidizes the commercial operations of American companies, allowing them to offer launch services to foreign commercial customers at little or no profit.

Despite Bigot's charges, the present level of government assistance for U.S. launch service companies does not rise to the level of support provided by European governments to Arianespace. U.S. government design assistance ended almost thirty years ago, but European government design assistance continues to this day (on the Ariane 5). The U.S. government does not offer financing guarantees and, unlike the case with Arianespace, does not own any portion of the inventory of American

136. *See* SPACE BUSINESS INDICATORS, *supra* note 40, at 17-19.

137. For example, in an article that appeared in SPACE NEWS in June 1992, Bigot accused McDonnell Douglas of making bids below its normal commercial rate in several international competitions. *See* de Selding, *supra* note 105, at 8.

This charge stems from three heated competitions in which McDonnell Douglas bested Arianespace, winning contracts to launch satellites for Germany, Indonesia, and, most recently, two satellites for South Korea. Perhaps the biggest disappointment came in October 1991, when McDonnell Douglas won a competition to launch a satellite for the state-owned German telecommunications authority, even though Germany is a member of ESA and German companies own about 19% of Arianespace's shares. Bigot claimed that McDonnell Douglas's bid in the German Telekom competition bordered on launch services dumping and amounted to a "throwaway price." *Id.*

McDonnell Douglas officials responded that other considerations, such as schedule flexibility, mission accuracy, and the McDonnell Douglas record of reliability all contributed to the purchase decisions. *Id.*

ELVs. Fundamentally, Arianespace is, at least in part, a European *government* enterprise, whereas U.S. launch services providers are private companies. These differences suggest that trade measures or some form of industrial policy may be advisable to "level the playing field" in this industry.

3. China

If there is one proposition with which the Europeans and the Americans agree, it is that China's participation in the launch services business must be carefully controlled to avoid undue harm to the Western launch industry.[138] Because it has already completed several commercial launches successfully, China's GWIC is a tangible, immediate threat. Its apparent willingness to charge substantially less than Arianespace or the U.S. launch companies makes GWIC a troublesome competitor.

As is the case with U.S. rockets, GWIC's Long March series of boosters owes its existence to military development programs of the late 1960s and early 1970s.[139] But from the time China attempted to enter the commercial market in the late 1980s, the United States and Europe have claimed that GWIC's launches receive on-going subsidization.[140] China denies subsidizing its launch industry and attributes its bargain prices to the low costs of materials and labor.[141] Actually, the support received by GWIC from the Chinese government is difficult to assess because the Long March boosters have few hard currency inputs. Indeed, because of its status as a state enterprise in a non-market economy, it is probably fruitless to attack GWIC on the grounds that it receives government subsidization. Proving the "actual cost" of GWIC launches would be extraordinarily difficult, and, more importantly, artificial. The better inquiry is to ask whether China has engaged in unfair pricing, designed to steal market share from Western suppliers.

On this count, China appears guilty as charged. The pattern of GWIC's bidding demonstrates an effort to attract business with low prices while remaining within the limits of the U.S.-China accord on trade in

138. *See* Heydon, *supra* note 4, at 145.

139. *See* Letter from Gwen Freed, Office of Commercial Space Transportation, U.S. Department of Transportation, to Ms. Soo Park (Oct. 25, 1993).

140. This charge is made despite the pricing constraints imposed by the U.S.-China agreement discussed more fully below. *See, e.g.*, Heydon, *supra* note 4, at 145.

141. *See* Green & Preston, *supra* note 32.

launch services.[142] This has resulted in bids that substantially undercut those of GWIC's Western counterparts. For example, in a 1992 competition for two Australian satellites, the Chinese bid was about one third less than the bids by Arianespace and McDonnell Douglas.[143] China won that contract, provoking stern protests from Western launch services companies.[144] More recently, in a competition that GWIC entered for the launch of an Intelsat satellite, the Chinese bid was closer to Western companies.[145]

The agreement negotiated with the United States in 1989 lies at the heart of the debate surrounding China's participation in the international launch services market.[146] In exchange for export licenses for American satellites, the agreement limited the Chinese to nine commercial launches during the period 1989 through 1994, prohibited the "bunching" of too many launches over a short time, and required pricing "on par" with Western suppliers.[147] Despite the agreement, obtaining U.S. export licenses for American-made satellites has been an on-again, off-again affair. No licenses were issued for six months following the "events" at Tiananmen Square, but subsequent action by President Bush resulted in the award of additional licenses.[148] A ban on licenses was automatically reinstated due to alleged violations of the Missile Technology Control

142. *See* discussion *infra* notes 146-47 and accompanying text.

143. *See* Green & Preston, *supra* note 52.

144. *Id.*; *see also* Heydon, *supra* note 4, at 144-45. This was the first Chinese launch under the agreement with the United States. As a first launch, it is considered "promotional" and thus exempt from the requirement that its pricing be "on par" with Western suppliers. *See Memorandum of Agreement Between China and the United States Regarding International Trade in Commercial Launch Services*, in *China-United States Agreements Regarding Commercial Satellite Launches*, 28 I.L.M. 596, 599 (1989) [hereinafter *U.S.-China Memorandum*]; Green & Preston, *supra* note 52, at 3.

145. *See Arianespace Selected for Intelsat 8 Deal*, FLIGHT INT'L, Dec. 16, 1992.

146. There were actually three agreements, one covering trade in launch services, another on safeguarding U.S. satellite technology, and a third on liability for accidents. *See China-United States: Agreements Regarding Commercial Satellite Launches*, 28 I.L.M. 596 (1989). The U.S.-China agreement was concluded without any European participation. This fact is a source of some tension between the United States and Europe. *See* Craig Covault, *Ariane Launch Operations Slowed by Satellite Problems*, AVIATION WK. & SPACE TECH., Feb. 8, 1993, at 24; Heydon, *supra* note 4, at 141. Interestingly, the Europeans have been included in negotiations to bring Russia into the commercial market.

147. *See U.S.-China Memorandum*, *supra* note 131, at 599-602. For a clarification of the terms of the agreement according to USTR's interpretation, see Letter from S. Bruce Wilson, Ass't USTR to Edward Browne, Martin Marietta Titan, Inc. (Jan. 27, 1989) (copy on file with author).

148. *See Bush Bars Satellite Exports to China, Cites Munitions List, Foreign Aid Law*, COMM. DAILY, May 2, 1991, at 3.

Regime; the Clinton Administration subsequently waived this ban.[149]

The U.S. launch industry has urged the United States Government to enforce strictly the 1989 agreement.[150] In fact, at industry urging, Congress passed the Export Facilitation Act in 1990, which would have superseded the 1989 agreement with even more stringent limitations on Chinese commercial launches.[151] This act would have required the President to verify Chinese compliance with the terms of the agreement before granting an export license. President Bush, however, did not sign the bill and Congress did not attempt to override his pocket veto.[152]

Some have complained that the Chinese have violated various provisions of the agreement with impunity. According to Lori Garver, director of the National Space Society (an industry trade group), U.S. companies believe China's pricing has been inconsistent with the accord.[153] In fact, the Chinese have underbid Western companies in every competition they have entered. Despite industry complaints, the Office of the U.S. Trade Representative ("USTR") has taken no action regarding Chinese compliance. Because the agreement will soon expire, it seems as if industry complaints will have ultimately had little effect.

D. Results: Projected Market Shares

Arianespace made huge inroads into U.S. market share during the mid-1980s. Nineteen ninety-one was a banner year for Europe, with Ariane rockets launching eleven of the sixteen commercial satellites successfully put into GTO.[154] Nineteen ninety-two and 1993 were more favorable to the United States, but Arianespace seems to be holding steady with a market share of more than fifty percent.[155] As of Spring 1993, Arianespace's annual market survey showed that of fifty-four civil and commercial launches booked for the ensuing three years (1993-1995),

149. *See* UNITED STATES DEPARTMENT OF COMMERCE NEWS, issued Jan. 6, 1994, at 1.

150. *See, e.g., U.S., China Begin Talks to Review 1989 Satellite Launch Agreement*, DAILY REPORT FOR EXECUTIVES (BNA), July 11, 1990, at A-7.

151. H.R. 4653, 101st Cong., 2nd Sess. (1990); *see also* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 24.

152. *See* CONGRESSIONAL RESEARCH SERVICE, SPACE LAUNCH OPTIONS 8 (Dec. 17, 1990) (David P. Radzanowski & Marcia S. Smith).

153. The National Space Society has already drafted a § 301 petition and has threatened on numerous occasions to file it with the USTR. Telephone interview with Lori A. Garver, Director, National Space Society (July 7, 1992).

154. *See Market Trends*, *supra* note 24.

155. *See* Chien, *supra* note 109.

fifty-seven percent are booked with Arianespace, twenty-six percent with General Dynamics, and thirteen percent with McDonnell Douglas.[156]

In coming years, the Chinese will probably garner a portion of the market on the basis of price, perhaps an average of one or two launches annually. Of course, that share will be constrained by factors such as the ability to obtain U.S. export licenses and GWIC's launch success rates. Russia's entry into the market will exacerbate the conditions of oversupply that will prevail from the mid-1990s onward, meaning less business for Western launch services companies. In short, although U.S. suppliers were able to maintain their market position in the early 1990s, their share will almost certainly dwindle in the future. Arianespace will also suffer from the condition of oversupply, but firm national commitments to the enterprise's success (at least for now) will ensure its continued presence in the market. These factors almost guarantee that, absent dramatic reductions in the cost of U.S. launch vehicles, American launch services providers will find it increasingly hard to compete in the GTO commercial market.[157]

III. NEGOTIATIONS ON TRADE IN LAUNCH SERVICES

In an effort to mitigate the impact of the current and impending oversupply of launch vehicles, the United States has pursued a variety of negotiated agreements to establish trade rules for launch services providers. This part reviews the most important of these efforts. It begins by examining the multilateral GATT talks and then moves to various bilateral negotiations.

A. *The GATT*

Although most approaches to date have been bilateral, the multilateral, comprehensive GATT services negotiations seem like a logical forum for

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156. *See Satellite Launch Demand Will Slow in Mid-1990s, Arianespace Predicts*, MOBILE SATELLITE REPORTS, Mar. 1, 1993, at 1.

157. LEO launches for some proposed mobile communications networks such as Iridium will absorb some excess capacity for the Proton, Delta II, and the Long March. The net effect of these LEO applications, however, will be limited because many will never come to fruition, and larger payload launchers will not be economically efficient for most such LEO satellites. *See* Andrew Lawler, *Report: LEO Market Limited*, Apr. 18-24, 1994, at 1, 20.

constructing a launch services trade regime. Using the GATT forum could have the additional advantage of including developing countries, many of which may eventually enter the launch services market, in any resulting agreement.[158]

1. *Specific Inclusion of Launch Services in the GATT*

At one point, it was suggested that the GATT negotiations on services specifically include discussion of launch services.[159] Informally, the USTR disfavored the idea.[160] The United States' lack of enthusiasm for the GATT forum was apparently rooted in its preference for bilateral negotiations.[161] From the U.S. perspective, it makes sense to pursue bilateral deals and then try to "multilateralize" any agreements reached. Moreover, the comparative ease of achieving bilateral accords and their comparative efficacy in these circumstances are also likely enticements.[162]

Whatever the forum, the U.S. space industry and its champions in the Administration and Congress are intent on protecting "buy American" provisions and other procurement restrictions favorable to U.S. suppliers from foreign attack.[163] In early 1992, the launch industry thought that the USTR was considering opening to negotiation government procurement of research and development launch services.[164] This mistaken belief about a change in negotiating strategy set off an immediate reaction. The

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158. *See* Brooks, *supra* note 10, at 99.

159. *Cf.* Andrew Lawler, *U.S. Agencies Eye GATT Talks With Growing Unease*, DEF. NEWS, Mar. 30-Apr. 5, 1992, at 1.

160. Telephone interview with Gerald Musarra, Office of the United States Trade Representative (Sept. 17, 1992).

161. This preference, which is somewhat at odds with the general U.S. policy regarding the GATT, is implicit in the 1988 Amendments to the Commercial Space Launch Act. *See* §§ 9, 102, 102 Stat. 3906 (codified as amended at 49 U.S.C. §§ 2601-2623 (1988)); Brooks, *supra* note 10, at 98.

162. To the extent that the U.S. and European satellite makers dominate the market, a firm agreement on trade in launch services between the U.S. and Europe could be enforced against third parties with satellite export controls. The desirability of using export controls indefinitely is questionable, since it presents an opportunity for competitors to gain market share. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 37. Export controls might, however, form the basis of an effective short-term strategy to control NME market entry.

163. *See* Lawler, *supra* note 159; Letter from Congressman Jim Bacchus, 11th District, Florida, to Ambassador Carla Hills, United States Trade Representative (Feb. 28, 1992) (on file with author). This position is uncomfortably inconsistent with the successful effort in 1990 by the U.S. Government to open internal Japanese Government satellite projects to non-Japanese satellite builders. *See* Heydon, *supra* note 4, at 142.

164. *See* Lawler, *supra* note 159.

controversy was ultimately resolved by a letter from Ambassador Carla Hills, assuring Florida Congressman Jim Bacchus that "the Administration decided . . . not to offer launching services for coverage under an expanded Government Procurement Code."[165] By keeping launch services off the table altogether, government procurement of launch services did not become a sore spot for other GATT parties, and the agreement ultimately reached did not specifically address the government procurement issue.

2. *Coverage of the Services Text of the GATS*

Although the GATT agreement does not specifically cover launch services, it could be argued that the General Agreement on Trade in Services Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations ("GATS") includes trade in launch services.[166]

A threshold problem is determining whether the nature of services trade covered by the GATS is broad enough to include trade in launch services. In defining "trade in services," Article I of the GATS states:

> [T]rade in services is defined as the supply of a service:
> (a) from the territory of one Member into the territory of any other Member;
> (b) in the territory of one Member to the service consumer of any other Member;
> (c) by a service supplier of one Member, through commercial presence in the territory of any other Member;
> (d) by a service supplier of one Member, through presence of natural persons of a Member in the territory of any other Member.[167]

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165. Letter from Ambassador Carla Hills to Congressman Jim Bacchus (May 22, 1992) (on file with author).

166. General Agreement on Tariffs and Trade — Multilateral Trade Negotiations (The Uruguay Round): General Agreement on Trade in Services ("GATS"), Dec. 15, 1993, 33 I.L.M. 44 [hereinafter GATS]. Services negotiations are actually separate from the GATT framework. Negotiators of the GATS report through the Trade Negotiations Committee ("TNC"), rather than the Group of Negotiations on Goods. *See* Brooks, *supra* note 10, at 99.

167. GATS, pt. I, art. I, *supra* note 166, at 48-49 (Scope & Definition).

This language appears easily broad enough to cover the typical launch services arrangement in which a launch company from country A supplies services in country A to a customer from country B.[168]

This definitional-scope question is only the first step in determining whether the GATS applies to trade in launch services. One of the most important articles of the agreement, part II, article II, "Most-Favored-Nation Treatment," requires that a party to the agreement "accord immediately and unconditionally to services and service suppliers of any other Member, treatment no less favorable than that it accords to like services and service suppliers of any other country."[169] This key article includes an opt-out provision.[170] Under this provision, all services are automatically covered by part II, article II *unless* they are specifically included in an annex to article II exemptions.[171] There is no annex that specifically excludes launch services from coverage by the GATS.[172] Therefore, unless the terms of another annex can be construed to exclude launch services from most-favored-nation treatment, part II, article II would apply to launch services.

Such a construction is unlikely. It might be argued that trade in launch services should fall under the Annex on Telecommunications.[173] However, although launch services are an integral part of the telecommunications industry, this annex is aimed at providing an exception to part II, article II "with respect to measures affecting *access to and use of* public telecommunications transport networks and services."[174] The annex clearly focuses on access to and use of telecommunications facilities, neither of which is affected — except in a very remote way — by laws favoring domestic launch services providers.

A search for coverage of launch services in the Annex on Air Transport Services[175] would be equally futile. The plain meaning of the

168. Launch services are somewhat unusual in this regard because the service itself may never cross an international frontier, even though the customer of the U.S. service is foreign. This fact poses a problem when applying some U.S. trade laws. *See infra* notes 210-212 and accompanying text.

169. GATS, pt. II, art. II, *supra* note 166, at 49 (Most-Favored-Nation Treatment).

170. *Id.*

171. *Id.*

172. The annexes excluding certain services under certain conditions from part II, article II coverage currently include: *Annex on Movement of Natural Persons Supplying Services Under the Agreement; Annex on Financial Services; Annex on Telecommunications;* and *Annex on Air Transport Services*. *See* GATS, *supra* note 166, at 69-77.

173. GATS, *supra* note 166, at 73.

174. *Id.* ¶ 1.1 (Objectives) (emphasis added).

175. GATS, *supra* note 166, at 76.

language in this annex does not include launch services.[176] Moreover, even if it could be contended that launch services constitute "air transport services," this annex specifically states that article II *shall* apply to "the selling or marketing of air transport services."[177]

Other important articles that might aid domestic launch services providers against Arianespace or GWIC turn out to be equally unhelpful upon closer examination. For example, the GATS includes an article on subsidies (article XV),[178] but this article has almost no substance. Instead, article XV calls for multilateral negotiations to consider the trade-distorting effects of subsidies and "address the appropriateness of countervailing procedures."[179] The only remedy provided for a Member that believes that it has been "adversely affected by a subsidy of another Member" is a "request [for] consultations with that Member on such matters."[180] Such requests "shall be accorded sympathetic consideration"[181] — hardly a complete remedy.

Government procurement is also excluded from the requirements of national treatment, market access, and most-favored-nation treatment.[182] Article XIII provides an exception for regulations "governing the procurement by governmental agencies of services purchased for governmental purposes and not with a view to commercial resale or with a view to use in the supply of services for commercial sale."[183] The GATS provides for multilateral negotiations on government procurement in services within two years from the entry into force of the Agreement, but there is no concrete requirement for liberalization.[184] Thus, national procurement laws that favor local service providers are completely acceptable under the GATS.

Even if launch services could be squeezed into one of the categories discussed above, there are numerous, broadly worded provisions that allow nations to escape the limited number of requirements that the

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176. The annex obviously is intended to apply to services provided by commercial aircraft. It states, "[t]his Annex applies to measures affecting trade in air transport services, whether scheduled or non-scheduled, and ancillary services." *Id.*

177. *Id.* ¶ 3, at 77. The exceptions granted by the annex to article II coverage relate to air traffic rights. *Id.*

178. GATS, pt. II, art. XV, *supra* note 166, at 59 (Subsidies).

179. *Id.*

180. *Id.*

181. *Id.*

182. GATS, pt. II, art. XIII, *supra* note 166, at 57 (Government Procurement).

183. *Id.*

184. *Id.*

agreement actually would impose. For example, the national security exception permits laws restricting trade in services where a country considers such laws "necessary for the protection of its essential security interests . . . relating to the provision of services as carried out directly or indirectly for the purpose of provisioning a military establishment."[185] This language could easily justify protection of an indigenous launch industry as a backup for a nation's military launch capability.[186]

A category of so-called "general exceptions" is also available for countries seeking to avoid the application of the agreement's rules.[187] Of course these exceptions cannot be "applied in a manner which could constitute a means of arbitrary or unjustifiable discrimination . . . or a disguised restriction on international trade in services."[188] Still, a number of legitimate arguments could be made under this section for laws that discriminate against foreign launch services companies. For example, provisions offering an exception for laws "necessary to protect human, animal, or plant life or health"[189] could be used to rationalize prohibitions on export of satellites for launches by Arianespace because the risk of damage to the natural environment of French Guiana. Similarly, Arianespace could claim that Cape Canaveral is located too close to the Canaveral National Seashore and the Merit Island National Wildlife Refuge, both protected areas.

Services have been a GATT stumbling block since negotiations began in 1986[190] and unfortunately the GATS leaves the majority of the important issues unresolved and subject to future negotiation. For American companies concerned with potentially unfair foreign trading practices, this means that the GATS offers little assistance. Because the agreement's enforcement mechanisms are weak, bilateral negotiations, American trade laws,[191] and other domestic developments will overshadow the GATS in their effects on the launch services industry.

B. Other Negotiations

185. GATS, pt. II, art. XIV *bis*, *supra* note 166, at 59 (Security Exceptions).
186. *Cf. infra* notes 232-35 and accompanying text.
187. *See* GATS, pt. II, art. XIV, *supra* note 166, at 57 (General Exceptions).
188. *Id.*
189. *Id.* at 58.
190. *See* Brooks, *supra* note 10, at 97.
191. One possible benefit to the GATS is that violating its provisions could serve as the basis of a § 301 action. *See infra* notes 213-226 and accompanying text.

1. The "Rules of the Road" Talks with Europe

The on-going "Rules of the Road" talks ("ROR Talks") are bilateral negotiations between the United States and Europe concerning trade in launch services. They have been an important part of the U.S. effort to build a fair trading regime in the launch services market.

Although the exact scope of the ROR Talks is secret, any accord would likely contain at least two features. First, there would be an agreement on launch pricing. This would establish the set of costs to be included in launch prices and would encourage pricing on par with market rates.[192] The former would help eliminate claims of launch services dumping,[193] and the latter would discourage predatory pricing. The second main feature of an agreement would be a delineation of permissible and impermissible non-price concessions.[194] This would avoid charges of unfairness based on favorable financing or assistance in obtaining insurance. Unfortunately, the talks have thus far been conducted in relative obscurity and there is little evidence of material progress. Despite optimism expressed by some that 1992 would produce an agreement,[195] none was reached.[196] In 1993, U.S. attention was focused on U.S.-Russia negotiations, and the ROR Talks produced no agreement. The talks have also followed an on-again, off-again pattern because of institutional problems on the European side.[197]

Even if the ROR Talks are successfully completed, the resulting bargain will not be a panacea. Presumably, any agreement would be aimed at maintaining current market shares for Western companies.[198] Such a task, however, would be far from easy. Under a cost-based trading regime, Arianespace will not necessarily find its competitive edge eroded, at least in part because even if government support ceased immediately, Arianespace would have substantial advantages owing to the

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192. Compare the U.S.-China agreement which specifies that GWIC bids be on par with Western bids. *See supra* note 144.

193. *See supra* note 137 and accompanying text.

194. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 35.

195. *See, e.g.*, *Trade Hearings*, *supra* note 23, at 2 (prepared statement of Alan M. Lovelace, General Dynamics Corp.).

196. As the election heated up, there was little incentive to move forward on the ROR talks. Moreover, the staff at USTR was apparently focused on the NAFTA negotiations. Telephone interview with Gerald Musarra, USTR (July 14, 1992).

197. Apparently, there is a jurisdictional dispute between ESA and the European Commission ("the Commission"). *See* Lawler, *supra* note 159, at 7.

198. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 35.

recency of the assistance it has received from European governments.[199] Additionally, as the discussion in part II suggested, Arianespace has many cost advantages unrelated to government support.[200] Conversely, U.S. manufacturers show no signs of making significant reductions in manufacturing costs in the foreseeable future,[201] and at present there is no effort to develop the next generation of launchers.[202] Thus, even following the "rules of the road," Arianespace will probably increase its market share at the expense of U.S. suppliers. A U.S.-Europe agreement would also do little to protect current market shares from the onslaught of Russian and Chinese competition.

There are other problems with any agreement that the ROR Talks might establish. On the technical side, enforcement would be difficult. Export controls — designed to prevent technology transfers that threaten national security — are not designed to be used as trade enforcement mechanisms and may be too cumbersome. Likewise, although Section 301 of the Trade Act of 1974 could be used, this is a fairly unwieldy tool, and use of it may be too politically sensitive to provide steady enforcement.[203]

Finally, one must consider whether a managed trade approach would be disadvantageous in the net analysis. To the extent that such an approach were effective, incumbent launch providers would benefit from a constricted supply of launch services, but customers, including domestic satellite companies and consumers of telecommunications services, would suffer in the form of artificially high prices.[204] Similarly, as other satellite manufacturers improve their capabilities and performance, export control mechanisms would become useless enforcement tools.[205]

In short, the ROR Talks do not offer a complete solution to the dilemma faced by U.S. launch services companies. This does not mean that they are superfluous. However, without a government-supported effort to lower costs, improve technology, and develop new launch

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199. The CBO suggested in 1991 that Arianespace's inherent advantages, such as geography and newer rocket designs, may be the keys to its competitive success. *See id.* at 35-37.

200. *See supra* 118-30 and accompanying text.

201. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 36.

202. *See supra* note 124 and accompanying text.

203. *See infra* notes 213-215 and accompanying text.

204. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 36. As one satellite company official has noted, the domestic satellite industry is significantly larger than the launch services industry.

205. *See supra* note 162 and accompanying text.

vehicles, U.S. firms will not be able to sustain their market position.

2. *Bilateral Negotiations with Russia and China*

As discussed in part I, the United States reached accords with both Russia and China regarding each country's participation in the commercial launch services industry. The Chinese agreement will soon expire, and there is little reason to believe it will be renewed. The Russian agreement will last into the next century, but already serious questions have arisen as to interpretation, leaving the effectiveness of the agreement over the longer-term open to question.[206]

There are other reasons that limit the effectiveness of the agreements. First, Western bids can vary by as much twenty-five percent for the same launch.[207] The absence of a more established rate structure means that price restrictions are difficult to enforce. For example, Russia could easily offer bids that undercut Arianespace and American bids, arguing that they were reasonable given the general range of bids.[208] Similarly, the presence of even marginally lower Russian or Chinese bids will likely exert downward pressure on market prices and, therefore, Western launch companies' profits. Finally, as U.S. providers have discovered in the case of China, political concerns make enforcement of pricing agreements — even in cases of clear violations — exceedingly difficult.[209]

IV. GOVERNMENT RESPONSES TO ASSIST SUPPLIERS OF LAUNCH SERVICES

As the preceding suggests, international agreements and negotiations do not offer much in the way of hope for U.S. launch services manufacturers. Instead, U.S. manufacturers may have to rely on direct and indirect government assistance or on unilateral trade measures to secure their place in the market. This part examines the efficacy of these two possible approaches.

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206. *See supra* note 69 and accompanying text; *Space Hearings*, *supra* note 26, at 51-53 (prepared statement of Steven D. Dorfman, Hughes Space and Comm. Co.).

207. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 28 (noting that prices for Atlas 2 launches ranged from $60 to $85 million in 1989 dollars).

208. Exchange rate fluctuations make "equating" bids even more difficult.

209. *See supra* notes 150-53 and accompanying text.

A. *Applying U.S. Trade Laws*

1. *Countervailing Duty and Antidumping Measures*

Countervailing duty and antidumping measures[210] are common tools to combat unfair foreign trade practices. Both are aimed at importation of goods into the United States. Services do not fall within the technical coverage of domestic countervailing duty or antidumping laws.[211] Launch services would therefore not fall within the ambit of these laws. Launch services are also not "imported" into the United States.[212]

2. *Relief from Unfair Trade Practices*

Section 301 of the Trade Act of 1974 has broader language not limited by the requirement that merchandise cross an international frontier.[213] Section 301 gives powers to the USTR to combat unfair trade practices, which essentially include any otherwise unjusticiable injury to U.S. commerce.[214] Because Section 301 also specifically applies to trade in services,[215] it could provide a weapon against foreign governments that engage in unfair trade practices in the launch services market.

Using this provision, Transpace Carriers, a U.S. launch service vendor, filed a petition in 1984 against the European governments participating in the development of the Ariane rocket.[216] Transpace

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210. Countervailing duties are authorized under § 303 of the Tariff Act of 1930. 19 U.S.C. § 1303 (1988). Antidumping relief is available pursuant to § 731 of the Tariff Act. 19 U.S.C. § 1673 (1988). A variety of statutory requirements must be met before either remedy is appropriate. *See, e.g.*, Brooks, *supra* note 10, at 87-88.

211. *See* 19 U.S.C. § 1303(a)(1) (1988) (limiting countervailing duties to "article[s] or merchandise"); 15 U.S.C. § 72 (1988) (limiting antidumping provisions to "articles").

212. For an interesting discussion examining the difficulties associated with possible legislative changes that would apply countervailing duty and antidumping law to this context, see Brooks, *supra* note 10, at 89-92.

213. 19 U.S.C. § 2411 (1988).

214. *Id.* § 2411(a)(1)(b)(ii).

215. *Id.* § 2411(c)(1)(b).

216. The petition charged that: (1) Arianespace uses a two-tier pricing policy whereby it charges higher prices to ESA Member States than to foreign customers; (2) CNES subsidizes launch and range facilities, services, and personnel provided to Arianespace; (3) CNES subsidizes the administrative and technical personnel it provides to Arianespace; and (4) Arianespace's mission insurance rates are subsidized. In addition to these allegations, the U.S. also investigated three other areas: government inducements to purchasers of Arianespace's services; direct and indirect government assistance to Arianespace; and Arianespace's cost and pricing policies. Determination Under Section 301 of the Trade Act of 1974, 50 Fed. Reg. 29,631 (1985) [hereinafter Transpace 301 Determination].

maintained that Arianespace was the beneficiary of preferential treatment and subsidies.[217] USTR declined to act on the petition, finding that the European practices did not differ sufficiently from American practices "to be considered unreasonable under Section 301."[218] Specifically regarding pricing, USTR found Arianespace pricing was a function of normal market forces.[219]

The Transpace petition highlighted many of the problems inherent in applying Section 301 to the launch services industry. First, USTR will be reluctant to invoke this authority where it is shown that the United States has engaged in many of the same practices, even if to a lesser degree.[220] The report of the USTR observed that the launch services market, at the time in question, was fairly thin, and that ascertaining "reasonable" practices was difficult.[221] Perhaps now that the market has matured, a Section 301 petition would not encounter this difficulty. Certainly, in the case of China, these concerns can be overcome. Unlike the Arianespace petition filed by Transpace, a Section 301 action against the Chinese could rely on the 1989 U.S.-China launch agreement.[222] This would avoid the situation of offsetting subsidies and focus instead on the commitments made by the Chinese in the 1989 accord.[223]

However, other problems remain. First, at least in the case of Arianespace, the USTR cannot point out clear violations of an international trade agreement,[224] meaning that any petition would have to rely on the hard-to-prove subsidy basis that has already failed once. Second, the GATS provisions on dispute resolution will sharply limit U.S. ability to

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217. *Id.*

218. *Id.*

219. *Id.* at 29,632.

220. This was clearly a concern in the Transpace case. *See id.* at 29,633.

221. *See id.* at 29,631, 29,633.

222. The National Space Society filed a § 301 petition two years ago but did not pursue it because of a lack of enthusiasm from launch service companies and a cool reception by USTR (the petition is presently inactive). *See* Telephone interview with Lori Garver, *supra* note 153.

223. Unfortunately, the best basis for a § 301 claim, pricing in violation of the agreement, is predicated on ambiguous language. The agreement requires only that China offer prices "on a par" with prices "prevailing in the international market for comparable commercial launch services." *See* U.S.-China Agreement, *supra* note 144, at 599. The meaning of "on a par" is not defined anywhere in the agreement. American manufacturers should ensure that any agreement that emerges from talks with Russia is sufficiently clear to form the basis of a § 301 action if necessary. For example, rather than using some subjective phrase like "on a par" to describe what prices will be permitted, a numerical formula would be more precise and less subject to arguments about compliance.

224. The discussion in part III demonstrates how difficult it would be to establish a clear violation of trade rules by Arianespace.

employ Section 301, even given a willingness to do so.[225] Finally, in such a compact industry, a Section 301 action risks foreign retaliation against American launch services companies or against firms in other aerospace areas.[226]

B. Domestic Efforts to Assist the Commercial Launch Services Industry

The policy issues surrounding the domestic launch services industry are inextricably linked to the belief that the United States should maintain a domestic launch capability.

Typically, arguments for U.S. government intervention to assist launch companies begin with a review of the beleaguered aerospace industry, where cutbacks in defense spending have hit hard.[227] Parent companies of launch services providers have suffered major losses and dwindling government contracts work.[228] This translates into lost jobs[229] and heavy political pressure to protect threatened lines of business that remain profitable, such as launch services.

Public policy makers and economists meet these cries for help with the observation that aerospace companies are simply spoiled and should either learn to compete successfully or leave the market.[230] The launch services industry is an example of a market in which U.S. suppliers are increasingly unable to compete.[231] If the theory of comparative advantage is to

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225. *See* GATS, pt. V, art. XXIII, *supra* note 166 (Dispute Settlement and Enforcement).

226. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 35 (noting that retaliation could come in U.S. export markets larger than launch services).

227. *See, e.g.*, Steven Pearlstein, *The Rush to Find Partners: Defense Firms Reacting to End of Cold War*, WASH. POST, Nov. 24, 1992, at A1.

228. The two major suppliers of commercial launch services, McDonnell Douglas and Martin Marietta (formerly General Dynamics), have both had poor earnings performance over the past several years. *See generally id.*

229. For example, Southern California, an area of concentrated aerospace manufacture, has lost thousands of jobs over the past several years. It is difficult to know how many jobs are provided by the U.S. space industry per se. One late 1980s estimate put the national number at roughly 200,000. *See Space Related Employment Shows Strength*, AVIATION WK. & SPACE TECH., Feb. 15, 1988, at 73. Department of Commerce figures place commercial space revenues for 1992 at just under $5 billion. *Commerce Department Offers Satellite Outlook for 1993*, SATELLITE NEWS, Feb. 1, 1993, *available in* LEXIS, News Library, Curnws File. Revenues from sales of commercial launch services were projected by the Commerce Department to be around $500 million. SPACE BUSINESS INDICATORS, *supra* note 40, at 11.

230. *Cf.* Reynolds & Merges, *supra* note 5, at 12 (citing the traditional economist's argument that comparative advantage theory suggests "strategic industries" are an inefficient way in which governments can spend money).

231. Chinese and Russian launch companies offer the lowest "cost to orbit" by a

be taken seriously, this suggests that the United States should abandon the market, and that any argument for a domestic launch capacity must rest on other grounds.

The better argument for maintaining a domestic launch capability is that launch services fall within the class of so-called "strategic industries"[232] that nations support even when traditional comparative advantage theory dictates otherwise.[233] Commercial launch companies operate as an adjunct to public sector (most importantly, military) launch capability. This capacity acts as a reserve in the event of unforeseen circumstances.[234] All launches, including public sector ones, are also less expensive in part because of the broader industrial base created by a successful commercial adjunct.[235] Similarly, commercial launch applications create "spin-off" technologies usable in other advanced industries.[236] Domestic launch capability also aids the development of the rapidly expanding telecommunications industry.[237] Finally, the launch industry is an important consumer of many specialty products like aerospace alloys and electronic components, making it easier for domestic producers of these products to obtain sufficient business to operate efficiently.[238]

Given this need, the next issue is how to ensure that U.S. launch

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substantial margin. Moreover, at least the latter have been proven reliable, efficient, and as technologically capable as their Western counterparts. *See supra* notes 48-85 and accompanying text discussing Chinese and Russian participation in the launch services markets. *See also There and Back Again*, supra note 132, at 10.

232. *See generally* ROBERT GILPIN, THE POLITICAL ECONOMY OF INTERNATIONAL RELATIONS 187-90, 215-30 (1987). Strategic industries are thought to be essential to a nation's overall military and economic well-being. For a brief discussion of arguments for and against the concept of strategic industries, see CONGRESSIONAL BUDGET OFFICE, FEDERAL FINANCIAL SUPPORT FOR HIGH-TECHNOLOGY INDUSTRIES 3-4 (1985).

233. Reynolds & Merges take this position. *See* Reynolds & Merges, *supra* note 5, at 21-23.

234. For example, the *Challenger* disaster in 1986 temporarily left the U.S. Government without sufficient lift capability. *See supra* notes 19-23 and accompanying text. A commercial launch services industry could have filled that gap. Commercial suppliers also provide emergency "surge" capability to the U.S. military. *See* Reynolds & Merges, *supra* note 5, at 21-22.

235. A report by the CBO in the mid-1980s showed that lower production levels dramatically increase per unit costs. *See* E. BLOND & W. KNITTLE, AEROSPACE CORP., SPACE LAUNCH VEHICLE COSTS 25 (1984) (prepared for the Dept. of Transp., Off. of Com. Space), *cited in* SETTING SPACE TRANSPORTATION POLICY, *supra* note 4, at 30-33.

236. *See* Reynolds & Merges, *supra* note 5, at 21.

237. For example, satellites will play an essential role in the "National Information Infrastructure" that has lately been the subject of much discussion among many policy makers. *See* Richard DalBello, *The Role of Satellites in the National Information Infrastructure Initiative*, VIA SATELLITE, Feb. 1994, at 48.

238. *See* Aaron Karp, *The Commercialization of Space Technology and the Spread of Ballistic Missiles*, *in* Papp & McIntyre, *supra* note 15, at 179, 182-88.

companies survive into the next century. Part II demonstrated that beyond foreign subsidies and predatory pricing, the basic problem facing U.S. launch providers is their increasing inability to compete on price and ancillary services. Although international agreements regulating the market entry of NMEs and European pricing will aid domestic suppliers, more fundamental assistance is required if the domestic launch industry is to survive into the twenty-first century.

The following sections address various forms that the needed assistance might take. It focuses on two kinds of support: regulatory measures designed to lower costs and economic support designed to provide direct and indirect subsidies to the industry.

1. *Regulatory Assistance*

Several regulatory measures could aid the flagging domestic launch industry. First, it has already been shown that insurance is an important component of launch costs.[239] Insurance rates in the launch industry are high because there are relatively few commercial flights, which makes risk spreading extremely difficult.[240] Moreover, the small size of the risk pool makes insurance companies reluctant to make the sort of long-term commitments that are often necessary to obtain large-scale capital investment at favorable rates.[241] The cost of insurance could be dramatically lessened, however, if the government abandoned its policy of self-insuring its launches and instead made use of the commercial insurance market.[242] This would provide a much larger base over which risk could be spread, making commercial insurance rates far less expensive. There is even some reason to believe that this would be economically advantageous for the U.S. Government.[243]

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239. *See supra* notes 106 and 121 and accompanying text.

240. To be precise, the space insurance sector is insufficiently broad for insurance underwriters to make it a successful "separate class of business." Therefore, insurance rates are much higher than wider risk sharing would allow. Moreover, when liability for failures exceeds a certain level, insurance coverage basically becomes unavailable. *See Commercial Space Markets: Launch Vehicles, Hearings Before the Subcomm. on Space of the House Comm. on Sci., Space and Tech.*, 102d Cong., 1st Sess. 148-49 (1991) (prepared statement of Patrick Rivalan, Senior Vice President, Space Underwriting, Int'l Tech. Underwriters, Inc.).

241. *See* Christensen & Greenberg, *supra* note 46, at 32.

242. *Id.*

243. Christensen and Greenberg note that government self-insurance costs are deceiving. Because the government does not accumulate insurance reserves, the costs of failures are usually paid for by reprogramming funds or with supplemental appropriations. This

It would also be helpful for the government to relax antitrust restrictions that have deterred cooperative research efforts among rocket makers.[244] There is already a trend among launch producers favoring collaboration on the next generation of rocket motors.[245] According to Don Fuqua, president of the Aerospace Industries Association, the collaborative research model will not succeed if antitrust laws are not relaxed.[246] Such a move would certainly not be unprecedented — indeed, McDonnell Douglas owes its existence to a relaxation of the antitrust laws.[247]

Other suggestions include the possibility of tax incentives for space development[248] and a greater effort to avoid government preemption of commercial use of the launch facility at Cape Canaveral.

2. *Economic Support*

The most obvious support that the federal government can provide to launch services companies is research into rocket motor technologies and, ultimately, a new launch vehicle. This was one aim of the NLS program.[249] Even without the NLS, an expanded basic research program funded by the government would be helpful to private companies.[250] Given the possible public sector uses of an ELV fleet (scientific and military), it would not be difficult to justify the government's support of

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post-failure redirection of monies usually comes at a greater "cost" (in terms of program sacrifice) than would have been incurred from simply obtaining commercial insurance in the first place. *Id.*

244. *See Industrial Base*, *supra* note 120; Brooks, *supra* note 10, at 84.

245. Monies from the now defunct Advanced Launch System development fund financed a consortium of rocket motor producers. *See* ENCOURAGING PRIVATE INVESTMENT, *supra* note 25, at 13.

246. *See Industrial Base*, *supra* note 120.

247. *See* Brooks, *supra* note 10, at 84.

248. Reynolds & Merges suggest that space is an undeveloped area and therefore it would not be unreasonable to give launch companies tax incentives to develop it in the same way that companies receive tax incentives for investing in other undeveloped areas, like Puerto Rico. *See* Reynolds & Merges, *supra* note 5, at 40 n.111.

249. *See supra* note 127 and accompanying text.

250. Two models are available for this sort of plan. The research could be conducted by government laboratories, such as the Jet Propulsion Laboratory in California. In the alternative, a government industry consortium could be formed along the lines of SEMATECH, a consortium designed to conduct research into semiconductor manufacturing technology. *See* Reynolds & Merges, *supra* note 5, at 35-36. The rationale for underwriting private sector research and manufacturing efforts is to avoid disappearance of an industry necessitating expensive government production. *See, e.g.*, Keith Bradsher, *Pentagon Tests New Policy in Subsidizing an Industry*, N.Y. TIMES, Apr. 28, 1994, at D1.

industry research.

Procurement is another area in which the government could provide much needed assistance to the U.S. launch services companies.[251] In the past, national security considerations and bureaucratic inertia have limited government procurement of commercial launch services.[252] Increasing the size of the "captive market" for U.S. suppliers would help cushion the blow of declining profits from foreign commercial sales.[253] As Table 5, *supra*, indicates, government demand is substantial.

Another way in which the U.S. Government can put American launch services companies on equal footing with Arianespace would be to offer Eximbank financing to satellite purchasers who select a domestic launcher provider.[254] Such financing has been very helpful in developing the satellite export industry.

These alternatives are realistic options.[255] In 1992, the House of Representatives passed H.R. 3848, a bill that would promote commercial space activities through buy-American rules for government procurement, funding for infrastructure development, provisions for government use of commercial launch services when possible, and limitations on liability.[256] The corresponding bill on the Senate side never made it out of committee and, therefore, the measure never made it to the President's desk.[257] Nonetheless, measures such as this indicate a clear willingness on the part of Congress to act in the interest of domestic producers.

The Administration is noticeably less interested. In March 1994, the Administration deferred indefinitely any plans for a new rocket.[258]

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251. The so-called Augustine Report (named after its chairman, Norman Augustine, Chairman of Martin Marietta Corp.) concluded that greater reliance on commercial procurement would improve the performance of the government space program. *See* NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, REPORT OF THE ADVISORY COMMITTEE ON THE FUTURE OF THE U.S. SPACE PROGRAM 43 (Dec. 1990).

252. *See generally* Christensen & Greenberg, *supra* note 46.

253. This strategy could run afoul of trade laws, however.

254. Eximbank financing is usually only available for goods that cross the U.S. border. Launch companies argue that this creates an incentive to buy American-made satellites and then launch them on foreign rockets. *See supra* note 120; *see also Space Hearings*, *supra* note 26, at 5 (prepared statement of David W. Thompson, Orbital Sciences Corp.).

255. As a matter of practical politics, one argument that must be overcome before any additional government support for the launch industry is obtained is that the aerospace industry is spoiled. After years of lucrative government contracts, aerospace companies may appear unwilling to make the sort of corporate commitments necessary to make themselves profitable.

256. *See Space Programs, Commercial Space Bills Pending in Congress*, 57 Fed. Contracts Rep. (BNA) 22, at d7 (June 1, 1992).

257. *Id.*

258. Ben Iannotta, *Draft Plan Defers New U.S. Rocket*, SPACE NEWS, Apr. 4-10, 1994

Instead, the White House strategy will focus on updating existing launchers.[259]

V. CONCLUSION

The launch services industry faces a difficult decade ahead. Despite the boom in telecommunications, excess launch capacity will create fierce competition and will drive profits down, perhaps eliminating them completely. Absent some improvement in the market or major government assistance, U.S. launch companies will face extraordinary difficulties. Any difficulties will be exacerbated if NMEs succeed in penetrating the market faster or deeper than anticipated.

Negotiations to establish a fair trading regime have been only partially successful. U.S. launch services firms cannot rely on these to secure their economic futures. U.S. trade laws are equally unhelpful. Countervailing duty and antidumping laws are wholly inapplicable. Except in the case of China, establishing the necessary elements of a Section 301 action would be difficult. In all cases, GATT limitations and concerns about retaliation may foreclose the possibility of unilateral trade action.

Instead, it appears that the best prospects for U.S. launch providers lie in regulatory and legislative measures designed to alter their competitive fortunes. Support for research, a rejuvenated government procurement program, and policies designed to lower insurance rates would dramatically lower costs. Combined with internationally negotiated rules on pricing, these steps could restore American launch companies' ability to compete with European and NME rivals and in any event would help preserve a vital sector of the U.S. industrial base.

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at 1.

259. *Id.*