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## The Commercial Space Launch Market and Bilateral Trade Agreements in Space Launch Services

James L. Reed

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# THE COMMERCIAL SPACE LAUNCH MARKET AND BILATERAL TRADE AGREEMENTS IN SPACE LAUNCH SERVICES

JAMES L. REED\*

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The growing demand for earth-orbiting satellite communication systems in the marketplace<sup>1</sup> foreshadows a burgeoning world revolution in wireless telecommunications.<sup>2</sup> These commercial space ventures offer substantial economic benefits, particularly for the United States satellite industry—the world leader in satellite-related technologies. But just as the potential revenues from these space-based

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1. See *Activate the Money Star: Satellite Operators: Suddenly Everybody is Ordering Satellites Again. It Marks a Big Gamble on Consumer's Passion for Television and the Internet*, ECONOMIST, May 3, 1997 (stating that the ambitious plans for satellite telecommunications services are resulting in an unprecedented number of applications for orbital slots and user licenses).

2. See John Verity, *What's Hot? Anything Connected with networking Internet Technology, Electronic Commerce, Networking and Wireless Communication Lead The Pack*, COMPWORLD, Sept. 29, 1997, available in 1997 WL 7735976 (describing a number of developing space-based telecommunication systems which "will flood any spot on the earth's surface with megabits of data per second.").

telecommunication systems begins to unfold,<sup>3</sup> there remains a central question facing investors: can the space launch services<sup>4</sup> industry meet satellite launch demands?

The United States and Europe are the world leaders in the commercial space launch services market.<sup>5</sup> These Western launch service providers supply most of the world's satellite launch services;<sup>6</sup> however, market forces are placing increased incentives on satellite companies to contract with non-Western launch services based in non-market economy nations. As a result, the interests of the commercial satellite industry conflict with United States policies restricting participation of non-market economy launch services in the satellite launch market. These governmental policies are set forth in three bilateral Space Launch Services Trade Agreements (launch agreements) between the United States and the Russian Federation,<sup>7</sup> Ukraine,<sup>8</sup> and the People's Republic of China.<sup>9</sup> The launch agree-

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3. See Theresa Foley, *Pie in the Sky?*, COMMWL, December 16, 1996, available in 1996 WL 8647456 (citing a report from a New York investment bank predicting revenues in the satellite communications business to triple by the year 2000).

4. "Space launch services" refers to the commercial entities which provide the service of launching and placing satellites into earth orbit using space launch vehicles (e.g. expendable rockets).

5. See Radmir Smirnov, *Redivision Of Space Market For The Benefit Of Russia Expected Early Next Century*, BIZIKON NEWS, Aug. 13, 1996, available in 1996 WL 6462719 (noting that the United States and European Union dominate the market).

6. See *Established Launchers Record Banner Year in 1996*, SPACE BUS. NEWS, Jan. 8, 1997, available in 1997 WL 8214951 (stating that by late 1996 there were twenty-four commercial satellite launches, with the United States companies launching eleven, European Union (EU) launching nine, and Russia and China each launching two. Thus, the United States and the EU launched 83% of all commercial satellites in 1996).

7. See Agreement Between The Government of the United States of America and the Government of The Russian Federation Regarding International Trade In Commercial Space Launch Services, September 2, 1993, State Dept. No. 93-177, available in 1993 WL 444618 [hereinafter 1993 Russia Trade Agreement]; Agreement Between The United States And Russia Amending The Agreement Of September 2, 1993, Regarding International Trade In Commercial Launch Services, January 30, 1996, State Dept. No. 96-37, available in 1996 WL 163957 [hereinafter 1996 Russia Amendment].

8. See Agreement Between The Government of The United States of America and The Government of Ukraine Regarding International Trade in Commercial Launch Services, February 21, 1996, State Dept. No. 96-51, available in 1996 WL

ments set forth policies designed to accommodate the needs of the satellite industry, promote economic reform in non-market economies, and minimize disruption to the United States space launch services marketplace.<sup>10</sup>

On September 19, 1996, the Clinton Administration announced that at the expiration of the three launch agreements, the United States will replace "negotiated trade" in commercial launch services with a "trade environment characterized by the free and open interaction of market economies."<sup>11</sup> The 1996 Space Policy announcement reflects a rapidly expanding commercial environment that has begun to convince policymakers that negotiated trade in space launch services has outlived its usefulness. The existing trade agreements expire at the end of 2001.<sup>12</sup> The question is, what type of market-oriented trading environment will best further United States interests in expanding markets in space after 2001?

Both the launch services industry and the satellite industry criticize the bilateral space launch agreements, but for different reasons. The Clinton administration now faces the challenge of developing a strategy to accommodate these often-diverging business interests. This Comment hopes to set forth a clearer understanding of the regulatory and commercial aspects of this marketplace and in doing so will reach the conclusion that market forces are an effective control on launch suppliers transitioning to market-orientated trade practices. Moreover, this Comment suggests that recent events in the marketplace offer new opportunities for reaching a multilateral trading consensus.

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195515 [hereinafter 1996 Ukraine Trade Agreement].

9. See Memorandum of Agreement Between the Government of the United States of America and the Government of the People's Republic of China Regarding Trade in Commercial Launch Services, March 13, 1995 [hereinafter 1995 China Agreement] (manuscript on file with author).

10. These market-orientated goals of the launch agreements with China, Russia, and Ukraine are the focus of this piece. For further discussion of these issues, see Part III.B *infra*.

11. See *Satellite Diary*, SATELLITE WK., Sept. 23, 1996, available in 1996 WL 7055404.

12. See 1993 Russia Trade Agreement, *supra* note 7, art. VIII; 1996 Ukraine Trade Agreement, *supra* note 8, art. VIII; 1995 China Agreement, *supra* note 9, art. VIII.

Part I presents a brief overview of the legal, economic, and political factors influencing the space launch services market since the early 1980s. The discussion focuses on the legislation implementing the United States commercial launch services industry, the issues surrounding entry into the marketplace by the People's Republic of China (China) and the launch suppliers of the former Soviet Union, and the failed attempt at reaching a multilateral trade agreement with the European Community. Part II describes the nature of the commercial space launch business, including the market and non-market factors that affect competitiveness and place special demands on launch service providers.

Part III analyzes each launch agreement. This part includes a discussion of the administrative aspects of the agreements, the approaches taken to deal with market uncertainties, and the differences between United States trade agreements with the Russian Federation, Ukraine, and China. The discussion then turns to the current debate over whether the agreements adequately provide for the needs of the satellite industry while ensuring a fair trading environment in space launch services.

Part IV highlights current trends in the marketplace and concludes that these market trends provide a strong argument for relaxing the quota-based restrictions on non-market economy service providers. Furthermore, Part IV suggests that a maturing space launch services marketplace is providing a realistic means for nations to begin reaching a consensus on multilateral trading rules.

## I. THE LEGAL FRAMEWORK SHAPING THE COMMERCIAL LAUNCH SERVICES MARKET: 1984-1996

### A. THE 1984 COMMERCIAL SPACE LAUNCH ACT AND 1988 AMENDMENTS

The early 1980s marked the beginning of the commercial launch services market.<sup>13</sup> Until 1986, there were really only two players:<sup>14</sup>

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13. See NATHAN C. GOLDMAN, *SPACE POLICY: AN INTRODUCTION* 129 (1992).

the United States, marketing the Space Shuttle,<sup>15</sup> and a European entity known as Arianespace, marketing the Ariane space launch vehicle.<sup>16</sup> In 1984, Congress passed the Commercial Space Launch Act as a means for encouraging private investment in the launch services industry.<sup>17</sup> The 1984 Act announced a strong United States policy interest in the development of a governmental infrastructure<sup>18</sup> for supporting private investment in a space launch services industry.<sup>19</sup> Congress's interest in supporting a commercial launch services industry has not faded in recent years.<sup>20</sup>

By passing the Commercial Space Launch Act Amendments (the 1988 Amendments), Congress affirmed the policy supporting private investment in commercial launch services.<sup>21</sup> After the 1986 Space Shuttle Challenger explosion, the United States decided that all commercial launches would be handed over to private rocket firms.<sup>22</sup>

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14. See Marcia S. Smith, *Space Launch Services—The Competitive Playing Field: A Primer*, at 3 (Cong. Res. Service, 1992) (noting that customers could use either NASA's Space Shuttle or Europe's Ariane for commercial satellite launches).

15. See GOLDMAN, *supra* note 13, at 127-28.

16. See *id.* at 34, 136.

17. See Commercial Space Launch Act of 1984, Pub. L. No. 98-575, §§ 2-3, 98 Stat. 3055 (codified as amended at 49 U.S.C. § 70101 (1994)). For a detailed analysis of the 1984 Act, see Kim G. Yelton, *Evolution, Organization and Implementation of The Commercial Launch Act and Amendments of 1988*, 4 J.L. & TECH. 117 (1989).

18. See Pub. L. No. 98-575, § 3, 98 Stat. 3055 (codified at 49 U.S.C. § 70101(b)) (stating that the purposes of the Act are to establish a regulatory authority for issuing licenses and facilitate the use of government launch facilities). Government oversight in space launch services was vested in the Secretary of the Department of Transportation. See Pub. L. No. 98-575, § 5(a), 98 Stat. 3055 (codified at 49 U.S.C. § 70103).

19. See 49 U.S.C. § 70101(a)(9). Congress found that "the participation of State governments in encouraging and facilitating private sector involvement in space-related activity, particularly through the establishment of a space transportation-related infrastructure . . . is in the national interest and is of significant public benefit." *Id.*

20. See David P. Radzanowski & Marcia S. Smith, *Space Launch Vehicles: Government Requirements and Commercial Competition*, 14 (Cong. Res. Service, 1997) (citing recent legislative initiatives that would further promote the space launch services industry).

21. See Pub. L. No. 100-657, 102 Stat. 3900 (codified as amended at 49 U.S.C. §§ 70101-70301 (1994)).

22. See Exec. Order No. 12546, *reprinted as amended* in 42 U.S.C. § 2465(f)

This policy change, combined with a need to supplement the provisions in the 1984 Act, led to the passage of the 1988 Amendments.<sup>23</sup> The 1988 Amendments revisited issues of launch vehicle liability insurance,<sup>24</sup> government launch facility costs, and investments in launch vehicles.<sup>25</sup> In addition, the 1988 Amendments issued an endorsement of trade negotiations that would provide the incentives for United States launch service providers to compete in a world market.<sup>26</sup>

The 1984 and 1988 Acts are strong policy statements issued on behalf of a commercial industry whose annual revenue is, even to this day, rather small in comparison to other industries.<sup>27</sup> These policies are justified, however, because a space launch capability is a

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(1994) (restricting the use of the Space Shuttle).

23. See generally S. REP. NO. 100-593 (1988) (noting that the 1988 Amendments are intended to facilitate satellite transfers from the shuttle launch manifest and to further encourage the development of a competitive United States launch industry). The 1988 Amendments provided the financial means for United States launch service providers to begin competing against Arianespace. See Jon C. Garcia, *Heaven or Hell: The Future of The United States Launch Services Industry*, 7 HARV. J.L. & TECH. 333, 335-37 (1994) (recognizing that the 1988 Amendments persuaded the United States launch industry to enter the commercial launch services market).

24. See 49 U.S.C. § 70112(a) (1994) (outlining a three-tier system of liability and placing a ceiling on potential liability to property, government facilities, and foreign countries); 49 U.S.C. § 70113(a) (describing the method of paying claims arising from launch vehicle liability). Insurance for space launches in the 1980s exceeded underwriter capacity. See generally S. REP. NO. 100-593 (stating that the United States launch industry cannot enter into a commercial environment without limiting potential liability for launch vehicle use). Prior to commercial launches, the government shouldered all costs. See *id.* After the 1984 Act, however, it became apparent that there were no underwriters willing to insure launch vehicles except at extremely high rates. See Garcia, *supra* note 23, at 373.

25. See 49 U.S.C. § 70301(a) (1994) (describing the means of improving access to space through matching grants, research in launch vehicle technologies, and the development of launch facilities).

26. See 49 U.S.C. § 70117(e) (1994) (encouraging dialogue between the United States and foreign competitors in establishing fair trading practices in commercial launch services).

27. See generally *Industry Opposition to U.S.-Imposed Launch Quotas Grows as Launch Demand Soars*, MOBILE SATELLITE NEWS, Feb. 6, 1997, available in 1997 WL 8299037 (stating that satellite industry revenues, which historically range between one and two billion dollars per year, roughly double the annual revenues of the commercial launch vehicle industry).



symbol of national prestige and political power;<sup>28</sup> it allows a nation's national security establishments to draw from resources developed in the private sector and offset government investment costs through commercial sales,<sup>29</sup> and it gives a nation direct access to space.<sup>30</sup> Thus, the economic assessment of investing in a commercial space transportation system stretches well beyond a traditional wealth-maximization analysis. A proper assessment of a nation's interest in investing in space launch vehicles must also consider factors which tend to blur "traditional boundary lines . . . [separating] national security, foreign policy, and economic policy" interests.<sup>31</sup>

#### B. THE 1989 AND 1995 SPACE LAUNCH AGREEMENTS WITH CHINA

China announced its intentions to enter the commercial launch market in 1985.<sup>32</sup> The state-subsidized company, Great Wall Industrial Corporation (GWIC), markets the Chinese launch vehicle known as Long March.<sup>33</sup> On 17 December 1988, the United States

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28. See Henry R. Hertzfeld, *Who's Who in Outer Space*, USA TODAY, July 1, 1994, available in 1994 WL 13637963.

29. See *Department of Defense Authorization For Appropriations For Fiscal Year 1996 And The Future Years Defense Program, Space Programs and the Department of Defense's Space Management Initiative: Hearings Before the Comm. On Armed Services United States Senate*, 104th Cong. 387, 180 (1995) [hereinafter *Military Space Power*] (testimony of Dr. Scott Pace, Policy Analyst, Critical Technologies Institute, The Rand Corp.) (describing how the United States national security interests would be served by a robust commercial space launch industry). Notwithstanding the technological benefits and government cost offsets arising from private investment and sales in commercial launch services, the military would benefit from a reserve fleet of space launch vehicles in a time of crisis. See *id.*

30. See *ME-II: Japan's Space Programme*, ECONOMIST, Feb. 12, 1994, available in 1994 WL 12757334 (stating that Japan incurred the enormous expense of developing its own space transportation system in order to end its dependence on foreign launch vehicles).

31. *Military Space Power*, *supra* note 29, at 182 (statement of Dr. Scott Pace, Policy Analyst, Critical Technologies Institute, The Rand Corp.).

32. See *Global Trade in Satellites and Launch Services: Hearing Before the Subcomm. on Space of the House Comm. on Science, Space and Tech.*, 103d Cong. 121 (1994) [hereinafter *1994 Global Trade Hearing*] (testimony of Donald Phillips, Ass't United States Trade Rep. for Industry) (discussing China's authorization of GWIC to market commercial launch services).

33. See *id.*

Trade Representative (USTR) and China initialed three separate agreements allowing for the export and launch of three United States satellites.<sup>34</sup> China's ascension into the Western satellite launch services market was contingent on agreements to abide by rules governing safeguards on technology transfers,<sup>35</sup> assigning liability in the event of a launch failure,<sup>36</sup> and engaging in fair trade.<sup>37</sup> Final export approval was vested in the Coordinating Committee for Multilateral Export Controls (COCOM).<sup>38</sup>

The 1989 China Agreement was an opportunity for the United States to establish trading rules early, while it still held the upper hand in the market. Since the United States dominated the satellite market, it could dictate the terms under which any nation wishing to

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34. See *State Department Regular Briefing*, FED. NEWS SERV., Dec. 19, 1988, available in NEXIS, Markets library, ALLNWS file.

35. See Memorandum of Agreement on Satellite Technology Safeguards, December 17, 1988, U.S.-P.R.C., State Dept. 89-114 (enforced March 16, 1989) [hereinafter 1989 China Tech Tran Agreement].

36. See Memorandum of Agreement on Liability for Satellite Launches, December 17, 1988, U.S.-P.R.C., State Dept. 89-115 (enforced March 16, 1989) [hereinafter 1989 China Liability Agreement]. For any joint space venture, the United States is potentially liable for any damage caused by a space launch or an orbiting body. See *id.* art III. This international obligation on the United States is founded on agreements set forth in 1972. See Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 961 U.N.T.S. 187 (entered into force Sept. 1, 1972). The 1989 China Liability Agreement requires China to promptly become a member of 1972 liability convention and assume full financial responsibility for any claims made against the United States. See 1989 China Liability Agreement, *supra*, art. III.

37. See Memorandum of Agreement Regarding International Trade in Commercial Launch Services, January 26, 1989, United States-P.R.C., State Dept. 89-116 (enforced March 16, 1989) [hereinafter 1989 China Agreement].

38. See *COCOM Decision in Jan.: China Meets Final U.S. Condition for Long March Launches*, COMM. DAILY, Dec. 20, 1988, available in NEXIS, NEWS library (noting that the agreement does not limit the power of the United States to issue export licenses). COCOM is an informal organization whose purpose is to bring into agreement all export controls against the former Soviet Union, the People's Republic of China, and the Warsaw Pact Nations. See Zachary S. Davis, et. al., *Proliferation Control Regimes: Background and Status*, at 26 (Cong. Res. Ser., 1992). COCOM was disbanded in March of 1994 and has since been replaced by a new multilateral export control regime. See The Wassenaar Arrangement for Export Controls for Conventional Arms and Dual-Use Goods and Technologies, August 1, 1996 (listing dual-use goods which include missile related technologies).

enter into the launch services market could do so.<sup>39</sup> The agreement also afforded United States satellite makers an opportunity to market satellites in China in exchange for launch contracts with Chinese launch vehicles.<sup>40</sup> Despite protests by Western launch service providers,<sup>41</sup> the agreement's terms were viewed as the best approach to avoid market disruption by China and expand United States markets.<sup>42</sup>

The 1989 China agreement placed specified limits on China's market share in the industry.<sup>43</sup> But the limits imposed by the trade agreement were not the only obstacle facing China. Political events also served to limit China's entry into the launch services market.<sup>44</sup>

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39. See *Washington Space Business Roundtable Regarding Launching U.S. Satellites Aboard The Chinese Long March Launch Vehicle*, FED. NEWS SERV., Oct. 12, 1988, available in NEXIS, NEWS library [hereinafter *1988 Space Roundtable*] (statement of Eugene McCallister, Assistant Secretary of State for Economic and Business Affairs) (stating that by issuing licenses for United States made satellites, the United States could establish a framework for the marketplace).

40. See *id.* (arguing that "by accepting these licenses, we have an opportunity to engage the Chinese").

41. See *id.* Some satellite industry representatives viewed China's entry into the launch vehicle business as a prerequisite for trade with China. See *id.* In contrast, many in the launch vehicle industry viewed China's entry as disruptive to the market. See *id.* Launch service industry criticism of China's perceived predatory trade practices continued in later years. See Smith, *supra* note 14, at 4; see also *Augustine: U.S. Companies Face Challenge of 'One World' Economy*, AEROSPACE DAILY, May 26, 1989, available in 1989 WL 2170186 (outlining three "degrees of 'uneven playing fields'" in the launch services competition with non-market economies); Radzanowski & Smith, *supra* note 20, at 11 (describing European complaints of China's underbidding for the launch contract of the Arabsat satellite); discussion, *infra* Parts III, IV (analyzing the current arguments posed by United States launch providers opposing launch agreements with non-market economy launch providers).

42. See generally *1988 Space Roundtable*, *supra* note 39 (suggesting that the agreements with China set a good precedent for future negotiations, but until the agreements are implemented, one cannot determine whether there exists a better means for achieving United States goals).

43. See 1989 China Agreement, *supra* note 37, art. II(C)(i) (limiting China to launching up to nine United States satellites); *id.* art. II(C)(ii) (stating that China must distribute its commitments to launch United States satellites proportionately over the nine-year term of the agreement).

44. After China's brutal June crackdown in Tiananmen Square only a few months after signing the 1989 China Agreement, the United States passed legislation that severely restricted all satellite exports to China. See Foreign Relations

Numerous satellite export sanctions were imposed on China from 1989 to 1993,<sup>45</sup> thus prohibiting the launch of United States satellites on Chinese rockets. These events suggest that the 1989 China Agreement served as both a trade agreement and a political bargaining chip.<sup>46</sup> In 1992, Vice President Elect Albert Gore criticized the previous administration's use of the 1989 China Agreement as a foreign policy tool.<sup>47</sup> In 1994, President Bill Clinton's Space Transportation Policy emphasized a more "pro-trade" approach in the space launch services marketplace.<sup>48</sup> The 1994 Space Policy set forth the

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Authorization Act, Pub. L. No. 101-246, § 902, 104 Stat. 83, *as amended by* Pub. L. No. 102-549, § 202(e), 106 Stat. 3658, *repealed by* 22 U.S.C. § 2778 (1994). The legislation prohibited the export of United States-built satellites to China unless the President reported to Congress that China had achieved certain political and human rights reforms or the export was in the national interests of the United States. *See id.* at § 902 (b) (1)-(2). The Tiananmen Square incident marked a significant shift in Congressional support of United States trade normalization with China. *See* Richard Bush, *America's China Policy and the Role of the Congress, the Press, and the Private Sector*, HERITAGE FOUND. REP., July 9, 1991, *available in* NEXIS, NEWS library (noting that after the Tiananmen Square incident, much of the support in Congress for liberalizing trade with China collapsed). The export bans for satellites were eventually waived by President Bush in December of 1989. *See* Letter to the Speaker of the House and the President of the Senate on the licensing of Communications Satellites for China, 11 WEEKLY COMP. PRES. DOC. 1972 (Dec. 19, 1989). Violations of the Missile Technology Control Regime (MTCR), however, led to more export sanctions in April, 1991 and August, 1993. *See The Missile Technology Control Regime* (visited Nov. 6, 1996) <<http://www.acda.gov/factshee/exptcon/mtr96.htm>> [hereinafter *MTCR*]; Dept. of State Pub. Notice 1857, 56 Fed. Reg. 32601 (1991); Dept. of State Public Notice 1857, 58 Fed. Reg. 45408 (1993).

45. *See* discussion, *supra* note 44 (listing export sanctions against China).

46. *See id.* (describing how the 1989 China Agreement was used as a means of influencing relations with China in light of the 1989 Tiananmen Square crackdown and instances of illicit missile sales); Smith, *supra* note 14, at 5 (arguing that the sale of United States F-16 fighter jets to Taiwan drove President Bush to waive export restrictions on China in 1992 in an effort to improve relations between the two nations).

47. *See Gore Focuses on Bush-Quayle Failures in Aerospace*, U.S. NEWSWIRE, Oct. 19, 1992, *available in* NEXIS, NEWS library (stating that the previous administration failed to establish space policies that focused on economic growth in the Aerospace market).

48. *See* White House Office of Science and Technology Policy, *Fact Sheet: National Space Transportation Policy* (visited Feb. 13, 1997) (released August 5, 1994) <<http://www.dot.gov/faa/cst/reports/nstp2.html>> [hereinafter *1994 Space Policy*] (suggesting that the goals in launch vehicle trade agreements are to foster a market-based competitiveness in launch services).

primary goal of achieving "free and fair trade"<sup>49</sup> in commercial launch services.

At the conclusion of the first Chinese Space Launch Agreement in December of 1994, China's entry into the space launch business was less significant than expected.<sup>50</sup> Chinese launches of Western payloads suffered a series of failures<sup>51</sup> while stringent export restrictions limited the number of launches of United States satellites.<sup>52</sup> By 1994, China was expected to launch only four out of the nine satellites permitted under the 1989 China Agreement.<sup>53</sup> Western launch providers were less fearful of China's potential to take away market share through abusive marketing practices.<sup>54</sup>

The United States entered into a second launch trade agreement with China in March 1995.<sup>55</sup> The agreement is expected to last until December of 2001.<sup>56</sup> Nevertheless, China continues to have difficulty gaining market share. Repeated launch failures,<sup>57</sup> and resulting losses of life,<sup>58</sup> continue to erode confidence in China's launch vehicle program.<sup>59</sup> The nation's poor launch record also raised launch insurance premiums to unmanageable levels.<sup>60</sup> As a result, China acknowl-

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49. *Id.* at 4.

50. See 1994 *Global Trade Hearing*, *supra* note 32, at 121 (testimony of Donald Phillips, Ass't United States Trade Rep. for Industry) (noting China's slower than expected entry into the launch services market).

51. See *China's Satellite Launch Record 1990-95*, FIN. TIMES, Jan. 27, 1995 [hereinafter *China Record*].

52. See discussion, *supra* note 44 (listing export sanctions against China).

53. See 1994 *Global Trade Hearing*, *supra* note 32, at 125 (testimony of Donald Phillips, Ass't United States Trade Rep. for Industry).

54. See Tim Furniss, *Ariane's Bullish Chief*, FLIGHT INT'L, July 13, 1994, at 23 (quoting Arianespace Chairman Bigot as saying that China is "not credible" in the launch services market).

55. See 1995 China Agreement, *supra* note 9, art. I.

56. See *id.* art. VIII.

57. See *China Great Wall Keeps Losing Launchers after Fatal Feb. 14 Failure*, SATELLITE NEWS, April 1, 1996, available in 1996 WL 7056757 [hereinafter *GWIC Failures*]; see also *China Record*, *supra* note 51 (showing that of the past eight Chinese launches, four have been failures).

58. See *GWIC Failures*, *supra* note 57 (describing launch failures which caused significant damage to nearby villages and killed 112 people).

59. See *id.* (stating that losses of life, increased insurance premiums and a 50% success rate are causing customers to turn away from Chinese launch services).

60. See *Long March Failures Bedevil China's Commercial Push*, AVIATION

edged that it cannot compete in the launch services market without international cooperation.<sup>61</sup>

### C. FAILURES AT REACHING A MULTILATERAL TRADE FORUM: THE UNITED STATES-EUROPEAN "RULES OF THE ROAD" NEGOTIATIONS

To date, the industry's heavy reliance on government subsidies have hindered efforts at reaching a multilateral trade agreement in commercial launch services.<sup>62</sup> A failed 1985 United States Section 301 petition, initiated pursuant to the United States Trade Act of 1974<sup>63</sup> against Arianespace, illustrates the difficulties of enforcing fair trade laws in the face of pervasive government subsidies.<sup>64</sup> The United States could not claim that Arianespace was engaging in unfair trade vis-à-vis government subsidies because the United States supported the shuttle program in much the same way.<sup>65</sup>

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WK. & SPACE TECH., Aug. 26, 1996 *available in* 1996 WL 10848638 (reporting satellite insurance company executives' pessimistic reactions to an August 18, 1996, Long March mission failure and questioning China's future in commercial launch services). One executive was quoted as saying that China's 50% success rate makes their launch vehicles uninsurable. *See id.*

61. *See* Craig Covault, *China Seeks Cooperation, Aims New Space Strategy: Beijing Calls for More Cooperation with the West as China Develops New Radar and Telecom Satellites*, AVIATION WK. & SPACE TECH. Oct. 14, 1996 (describing how China's push for economic cooperation is viewed as Chinese acknowledgment that they are falling behind Western competitors).

62. *See generally* Garcia, *supra* note 23, at 364 (arguing that the General Agreement on Trade and Services has been largely unsuccessful because, though it addresses subsidies, it provides inadequate remedies); *Restrictions Sought by Lockheed Aren't Needed or Appropriate, Bigot Says*, SATELLITE WK., Oct. 3, 1994, *available in* 1994 WL 8734091 (responding to United States requests for restricting United States satellite launches to United States launch vehicles, Arianespace's Bigot counters that the United States should seek out government subsidies just like everyone else).

63. *See* Pub. L. No. 93-618, § 301, 88 Stat. 2041 (codified as amended at 19 U.S.C. § 2411 (1994)). Even though authority for initiating an investigation by the USTR is now found in § 2411 of the United States Code, it is still popularly referred to as Section 301 power. *See generally* 19 U.S.C. § 2411 (1994).

64. *See* Garcia, *supra* note 23, at 369 n.216 (describing the petition brought against Arianespace and arguing that the failure of the 1985 Section 301 petition highlights the inability of governments to enforce trade rules in the commercial launch market).

65. *See id.* at 17 (stating that the USTR did not take actions against Arianespace because the government subsidies did not differ much from United States

Pursuant to the 1984<sup>66</sup> and 1988<sup>67</sup> Congressional Acts, the United States envisioned that the combination of bilateral trade agreements and ongoing United States-European negotiations would lead to a multilateral trading forum in commercial launch services.<sup>68</sup> The first determined effort to reach a multilateral trade agreement began in 1990 when President George Bush announced his National Space Policy,<sup>69</sup> setting the stage for the "Rules of The Road" trade negotiations.<sup>70</sup>

Little is known about why the "Rules of The Road" talks failed to achieve a mutual understanding of fair trading practices between the United States and European representatives.<sup>71</sup> The trade talks did, however, reach an agreement to treat the non-market economies of China and the former Soviet Union differently from their Western counterparts.<sup>72</sup> Nevertheless, subsequent efforts at establishing a multilateral trading environment have yet to produce more comprehensive agreements.<sup>73</sup>

#### D. THE ENTRY OF FORMER SOVIET LAUNCH PROVIDERS INTO THE COMMERCIAL LAUNCH SERVICES MARKET

The former Soviet Union encountered far greater United States and European resistance to entering the commercial launch services

subsidies for the space shuttle).

66. See Commercial Space Launch Act of 1984, Pub. L. No. 98-575, 98 Stat. 3055 (codified as amended at 49 U.S.C. §§ 70101-70301 (1994)).

67. See Pub. L. No. 100-657, § 9, 102 Stat. 3900.

68. See *1988 Space Roundtable*, *supra* note 39 (statement of E. McCallister, Ass't Sec. of State for Econ. and Bus. Affairs) (stating that the 1989 China Trade Agreement will set the stage for future agreements with other countries).

69. See *New Space Launch Policy Generally Suits Industry*, AEROSPACE DAILY, Sept. 10, 1990, available in 1990 WL 2196002 [hereinafter *Bush Space Policy*] (describing the Bush policy for fair trade negotiations with the European Space Agency (ESA)).

70. See *Trade Rep Urged to Consider Satellite With Launches in ESA Talks*, AEROSPACE DAILY, Oct. 19, 1990, available in 1990 WL 2195429 [hereinafter *ESA Talks*].

71. See Garcia, *supra* note 23, at 366 (stating that the 1990-1992 United States-European negotiations were conducted in relative secrecy).

72. See *ESA Talks*, *supra* note 70.

73. See *U.S. Booster, Satellite Builders Accept Russian Launch Deal*, AEROSPACE DAILY, May 20, 1993, available in 1993 WL 2556992 (discussing European inflexibility in negotiating trade rules for commercial launch services).

market than China did in 1989. There are two reasons for this trepidation. First, the former Soviet Union possessed advanced booster technology<sup>74</sup> and maintained a vast arsenal of vehicles far exceeding commercial demand during the early 1990s.<sup>75</sup> Second, fears of missile proliferation continued despite the demise of the Soviet Union.<sup>76</sup>

The Russians made their first significant in-road to the commercial launch services market in June 1992 when Russia was allowed to launch the United States-made INMARSAT<sup>77</sup> satellite on its Proton launch vehicle,<sup>78</sup> beginning the process of a future trade agreement.<sup>79</sup> After a series of disputes over Russia's missile sales to India<sup>80</sup> and Russia's agreeing to join the Missile Technology Control Regime (MTCR),<sup>81</sup> the United States and Russia signed the 1993 Russia Trade Agreement,<sup>82</sup> containing many of the same provisions as the

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74. See *Future of CIS Space Program Hinges on International Cooperation*, RUSSIAN AEROSPACE & TECH., April 6, 1992, available in 1993 WL 10245448 (stating that the Russians are technologically advanced in the area of launch vehicle services).

75. See Garcia *supra* note 23, at 343-44 (quoting an Aerospace executive's estimate that "Russian capacity represents ten times current world market needs").

76. See *Third World Space Launch Seen as Proliferation Concern*, BMD MONITOR, March 12, 1993, available in 1993 WL 2914177 (quoting a report which states that Russian and Ukrainian wishes to become space launch vehicle providers "could lead to new ballistic missile threats during the remainder of this decade"). A fear of ballistic missile proliferation, as an inevitable byproduct of commercializing soviet booster technology, continues to this day. See discussion, *infra* Part III.A.1 (summarizing the arguments lodged against efforts to establish a global market for space launch vehicles).

77. See International Maritime Satellite Consortium (INMARSAT) is an international organization founded in 1982 which provides satellite communication systems for ships. See GOLDMAN, *supra* note 13, at 13.

78. See *Russians Get Commercial Launch Agreement*, SPACE STATION NEWS, June 25, 1992, available in 1992 WL 2308308.

79. See *id.* (stating that the INMARSAT-Proton agreement marks the beginning of the establishment of a United States-Russian trade agreement).

80. See *Russian Satellite Deal Threatened by U.S. Concerns over Engine Export*, COMM. DAILY, June 28, 1993, available in 1993 WL 3622966.

81. See *United States Non-Proliferation Policy: Hearing Before the House Comm. on Foreign Affairs*, 103d. Cong., at 51 (1994) (statement by Lynn E. Davis, Undersecretary of State for Int'l Security Affairs) (stating that in September 1993 Vice President Gore and Prime Minister Chernomyrdin signed an agreement for Russia's future entry into the MTCR).

82. See *supra* note 7.



1989 China Agreement.<sup>83</sup>

An amendment to the 1993 Russia Agreement was signed in 1996.<sup>84</sup> In 1994, the Ukraine announced its intention to compete in the commercial launch services market.<sup>85</sup> In 1996, the Ukraine and the United States signed the 1996 Ukraine Agreement.<sup>86</sup>

The commercial relations precipitating the Russia and Ukraine Agreements differ in some respects from the commercial space relations between China and the United States. Chinese business activities in the space launch industry are limited to United States satellite launch deals on Chinese boosters. In contrast, when the 1993 and 1996 trade agreements with Russia were announced, United States launch vehicle companies were busy pursuing joint business ventures with their Russian and Ukrainian counterparts.<sup>87</sup> United States cooperation with the Russian Federation in the space launch services market put the launch agreements into a new light because now restrictions on foreign launchers would also restrict United States

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83. See 1989 China Agreement, *supra* note 37; see also discussion, *infra* Part III (detailing the provisions of the 1993 Russian Trade Agreement).

84. See 1996 Russia Amendment, *supra* note 7; see also discussion, *infra* Part III (describing the terms and conditions of the 1996 Russia Amendment).

85. See SATELLITE WK., May 10, 1993, available in 1993 WL 2612997 (untitled article).

86. See *supra* note 8.

87. The first United States-Russia joint venture in commercial launch services, Lockheed-Khrunichev-Energia-International, was announced in early 1993. See *Lockheed Signs Deal With Russian Firm to Market Proton Launcher*, SATELLITE WK., Jan. 4, 1993, available in 1993 WL 2613949; see also Chris Bulloch, *Riding The Bear: Western Satellites on CIS Launchers*, INTERAVIA BUS. & TECH., Nov. 1, 1996, available in 1996 WL 10896840 (noting that the joint venture has since been renamed to International Launch Services (ILS)). By the end of 1995, there were two additional joint ventures; STARSEM, between Russian and European aerospace companies, see *Trends in Space Launch Services*, *supra* note 89 (stating that the STARSEM joint-venture is made up of the European groups Arianespace and Aerospatiale and the Russian entities called the Russian Space Center and the Samara Space Center); and Sea Launch, between the United States and Ukraine. See *id.*

In addition to ILS, STARSEM and Sea Launch, several other related joint ventures have been formed. See *id.*; Pierre Sparaco, *Space Launch Industry Faces Dramatic Change*, AVIATION WK. & SPACE TECH., Dec. 16, 1996, available in 1996 WL 10850268 (listing several other joint ventures with Russian Federation launch providers).

launch companies' business opportunities.<sup>88</sup> Today, there are an ever-growing number of joint ventures between United States, Russian, Ukrainian, and European launch service providers.<sup>89</sup>

## II. THE NATURE OF THE MARKETPLACE

### A. DEMANDS IN THE COMMERCIAL SATELLITE MARKET

Space Launch vehicle providers serve both government and private satellite needs. Until recently, most United States satellite launches were for the United States government.<sup>90</sup> Now, the majority of business for space launch services comes from commercial entities.<sup>91</sup>

Most commercial space launch service contracts serve the satellite communications market.<sup>92</sup> The bulk of the satellite communications market consists of Low Earth Orbit (LEO)<sup>93</sup> and Geosynchronous

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88. See *United States Space Launch Strategy: Hearing Before the Space and Aeronautic Subcomm. of the House Science Comm.*, 104th Cong. 48 (1996) [hereinafter *1996 SLA Hearing*] (testimony of Donald W. Eiss, United States Trade Rep. for Industry and Labor, and Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern/Central Europe and Eurasia) (stating that the special joint venture provisions in the Ukrainian agreement are "necessary to accommodate the possible future entry of new United States-Ukrainian space launch business ventures which return a significant and tangible benefits to the United States economy").

89. See *Federal Aviation Administration Special Report, Trends in Space Launch Services: Globalization and Commercial Development*, <<http://www.dot.gov/faa/cst/bulletin/quarterly/9604/special.html>> (visited April 4, 1996) [hereinafter *Trends in Space Launch Services*] (listing a variety of international joint ventures forming with Russian and Ukrainian launch providers).

90. See UNITED STATES CONGRESS, OFF. OF TECH. ASSESSMENT, ACCESS TO SPACE: THE FUTURE OF UNITED STATES SPACE TRANSPORTATION SYSTEMS 3-6 (1990) [hereinafter ACCESS TO SPACE] (illustrating how the United States defense and civil programs dominated the 1990 launch services market).

91. See *1996 SLA Hearing*, *supra* note 88, at 28 (testimony of Mr. Robert Davis, Deputy Undersecretary for Space, Dept. of Defense) (reporting that commercial launches outnumbered government launches in 1995 and 1996).

92. See James R. Asker, *Commercial Growth Key to Space Sector*, AVIATION WK. & SPACE TECH., Mar. 13, 1995, available in 1995 WL 2235581 (calculating the percentage of market share taken up by communications satellite launches).

93. Low Earth Orbit or LEO is defined as a satellite orbit that is "100 to 1,000 nautical miles . . . above the surface of the Earth." See 1993 Russia Trade Agree-

Earth Orbit (GEO)<sup>94</sup> systems.<sup>95</sup> The GEO and LEO satellite systems represent two approaches for providing the same type of satellite telecommunication service to end-users.<sup>96</sup> The GEO and LEO satellite industries are therefore in direct competition with each other.<sup>97</sup>

Competition between GEO and LEO satellite providers directly correlates to the availability of launch vehicles in two respects. First, satellite launch contracts usually include all costs associated with placing a satellite into orbit, thereby bundling the cost of both the launch vehicle and the satellite.<sup>98</sup> Second, satellite contracts sometimes specify use of a particular launch vehicle because either the launch service provider, or those acting in the interest of the launch service provider, maintain a share in the satellite communications venture.<sup>99</sup> This aspect of the marketplace is significant for the fol-

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ment, *supra* note 7, art. I.

94. Geosynchronous Earth Orbit or GEO refers to "an orbiting altitude of approximately 22,000 miles above the earth." See 1993 Russia Trade Agreement, *supra* note 7, art. I.

95. See Asker, *supra* note 92.

96. See J.P. Schultz, Comment: *Little LEOs and Their Launchers*, 3 COMM. L. CONSPICUOUS 185, 186 (1995) (contrasting LEO and GEO approaches to providing satellite communications). The GEO satellite systems offer a single, continuous source for users. See *id.* In contrast, The LEO system deploys multiple smaller satellites accessed by different users depending on the satellite's latitude-longitude location. See *id.*

97. See, e.g., 1994 *Global Trade Hearing*, *supra* note 32, at 121 (testimony of R. Grabe, Vice President Orbital Sciences Corp. (OSC)) (complaining that the different pricing guidelines between LEO and GEO launch services are hurting OSC's competitive position in the LEO market).

98. See 1994 *Global Trade Hearing*, *supra* note 32, at 64 (testimony of Robert E. Berry, Pres. Space Systems/Loral) (stating that satellite communications customers are becoming increasingly interested in purchasing the complete system for placing a communication satellite into orbit).

99. See, e.g., *Special Report: Chinese Trying to Restore Faith in Long March*, SATELLITE NEWS, Sept. 16, 1996, available in 1996 WL 7057099 [hereinafter *Special Report*] (stating that China's involvement in the IRIDIUM satellite proposal could be the reason why China holds onto launch contracts despite a poor launch record); 1994 *Global Trade Hearing*, *supra* note 32, at 57-58 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (stating that countries chose particular launch vehicles for political reasons); Anatoly Tkachenko, *Russia's Space Industry Is a Profitable Business*, MOSCOW NEWS WKLY., May 26, 1993, available in 1993 WL 10245448 (describing Russia's investment in the INMARSAT satellite proposal and the investment in Russian launch capabilities for launches by this satellite consortium).

lowing reason: a launch services trade agreement can easily manipulate or distort competition between the LEO and GEO providers by specifying unequal terms under which LEO and GEO providers may contract with available launch service providers.<sup>100</sup>

## B. INVESTMENT IN SPACE LAUNCH VEHICLES

The commercial space launch market is now in transition from discriminatory government support structures toward a “free and fair trade” environment.<sup>101</sup> The launch vehicle market depends on government support and protectionism for several reasons. First, the market for commercial launch services is low volume.<sup>102</sup> Second, launch facility costs are too expensive to be supported by private investment.<sup>103</sup> Third, investments in launch vehicle technologies exceed private financial resources.<sup>104</sup> Thus, the concept of “free and fair trade” should be thought of as achieving mutually agreed upon trading rules,<sup>105</sup> not necessarily trade free from substantial government support structures.

An end to government financial dependence would facilitate a transition towards free and fair trade; however, such an end will not

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100. *See id.* at 121-22.

101. *See 1994 Space Policy*, *supra* note 48; 1996 Ukraine Trade Agreement, *supra* note 8; 1995 China Agreement, *supra* note 9; 1993 Russia Trade Agreement, *supra* note 7.

102. *See 1996 SLA Hearing*, *supra* note 88, at 89 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (stating that business volume is too low to support itself without government assistance).

103. *See 1996 SLA Hearing*, *supra* note 88, at 26 (testimony of Mr. Robert Davis, Deputy Undersecretary for Space for the Dept. of Defense) (describing the ways in which the United States supports launch facility costs for commercial launches).

104. *See The X-33 Reusable Launch Vehicle, A New Way of Doing Business?: Hearing Before the Subcomm. on Space and Aeronautics of the House Comm. on Science*, 104th Cong. 59 (1995) [hereinafter *X33 Testimony*] (statement of Ray A. Williamson, Senior Research Scientist, Space Policy Institute) (stating that the viability of the next generation launch vehicle depends on a substantial amount of government investment).

105. *See 1993 Russia Trade Agreement*, *supra* note 7, art. III (D) (describing “free and fair trade” as the absence of distorting grants or subsidies, inducements to international customers, offering of additional services, or providing unauthorized government financing).

likely occur anytime soon.<sup>106</sup> In addition to the commercial market's need for financial support, the United States and other participating governments have substantial national security and foreign policy interests in access to space.<sup>107</sup> As long as governments show a willingness to spend vast amounts of resources in space launch capability, no private entity can realistically enter the market solely through private resources.<sup>108</sup>

### C. THE RULES OF THE GAME

A competitor's reliance on government subsidies and strategies for dealing with the technological limitations of today's launch vehicles are the market forces guiding commercial launch service providers. Government involvement in the space launch services industry has the effect of hiding investment and support costs.<sup>109</sup> As a result, both investment and launch costs are not reflected in the offering price to a customer.<sup>110</sup> A competitive launch provider therefore, depends on the government to reduce costs.

The technological limits of today's launch vehicles create a unique business environment. All service providers are, of course, concerned with product reliability and cost; however, reliability in the launch

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106. See generally *X33 Testimony*, *supra* note 104 (describing the need for government support well into the next decade) (statement of Ray A. Williamson, Senior Research Scientist, Space Policy Institute).

107. See *supra* notes 28-31 and accompanying text (listing the economic, political and national security interests in supporting a space launch services industry).

108. See *1994 Global Trade Hearing*, *supra* note 32, at 88 (testimony of Peter B. Teets, Pres. Space Group, Martin Marietta Corp.) (stating that no private company can compete with a government).

109. See *1996 SLA Hearing*, *supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (recognizing that all nations with space launch vehicles rely on the government to shoulder some, if not most, of the costs). Consequently, the launch services offering price does not accurately reflect the level of investment needed to launch satellites into space.

110. See *id.*; Garcia, *supra* note 20, at 350-58; see also *1996 SLA Hearing*, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (stating that the non-market nations are not constrained by real costs and have the unlimited potential to offer lower prices to get market share).

services industry is of paramount concern.<sup>111</sup> Contract prices influence customer choice of launch vehicles; but success in this market is measured more in terms of a launcher's availability, mechanical reliability, and scheduling.<sup>112</sup> Without a highly reliable product, launch service providers compete by reducing the risk associated with space launch. The attractiveness of a launch service provider therefore, is measured in terms of the likelihood that the satellite will achieve orbit on time, not necessarily the lowest contract price.<sup>113</sup>

Launch vehicle unreliability forces competitors to minimize customer risks through options for launches on several different launch

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111. See, e.g., *Special Report - Launch Capacity, Reliability Remain Key Issues*, SATELLITE NEWS, May 6, 1996, available in 1996 WL 7056815 [hereinafter *Launch Capacity Report*] (stating that insurance providers are concerned over the launch industry's one-out-of-seven aggregate launch failure rates); Chris McConnell, *Fingers Crossed Over Arianespace Launch: Series of Rocket and Satellite Failures Has Industry on Edge*, BROADCASTING & CABLE, March 13, 1995, available in 1995 WL 7938409 (reporting conditions in the satellite insurance industry in 1995—following a year where insurance claims exceeded earned premiums—stating that if the upcoming Arianespace launch is a failure, insurance premiums could rise to a level that would threaten the viability of commercial space launch); *China's Exploding Space Program*, WORLD PRESS REV., June 1, 1996, available in 1996 WL 8399697 (stating that China's poor launch record could erase its cost advantage over other boosters and may even make Chinese-launched satellites uninsurable); *China Pressured to Prove Rocket Reliability*, DOW JONES INT'L NEWS SERV., Feb. 15, 1995 (stating that China's launch vehicle has to become more reliable); *New Heights for Satellite Risks; Rising Demand Will Test Capacity*, BUS. INS., March 11, 1996, available in 1996 WL 7532127 (stating that China's insurance premium has reached 27%). China's unwillingness to accept blame for launch failures best demonstrates the importance of proving reliability in the launch services market. See *Hughes Sabotage of Rocket "Beyond Realms of Credibility"*, AGENCE FR.-PRESSE, Feb. 16, 1995, available in 1995 WL 7760098.

112. See *id.*; James M. Gifford, *Going Up*, SATELLITE COMM., Feb. 1, 1996, available in 1996 WL 9314323 (stating how satellite competitors have resorted to bulk-launch vehicle purchases to cover delays, limited availability, and spread risks in the event of launch failures); *Special Satellite - '96 Wrap-Up Issue*, SATELLITE NEWS, Feb. 12, 1996, available in 1996 WL 7056695 [hereinafter *Special Satellite '96*] (quoting INTELSAT's Claude Burgio as saying "capacity is the name of the game in our business. Get it, launch it, and make it available as quickly as possible").

113. See *SS/Loral Inks Multimillion Dollar Launch Deal with Arianespace*, SATELLITE NEWS, May 6, 1996, available in 1996 WL 7056813 (quoting Arianespace's Avanzi as saying "customers are less concerned with the price than with the assurance that their payload will safely enter orbit").

vehicles.<sup>114</sup> When a launch failure occurs, the stand-down time can sometimes take several months.<sup>115</sup> Satellite customers who cannot achieve orbit on time suffer significant lost opportunity costs.<sup>116</sup> As a result, alternative launch options are bought-up, years in advance, to cover costly delays and minimize risks.<sup>117</sup> To alleviate this problem, major launch providers offer alternative launch vehicle manifests and increase the number of available replacement launch vehicles.<sup>118</sup>

Launch vehicle unreliability creates another highly influential factor affecting the marketplace, satellite launch vehicle insurance premiums.<sup>119</sup> Running as high as 27% of the total coverage for satellites using a more risky launch vehicle,<sup>120</sup> insurance premiums can effectively eliminate any cost advantage of one launch vehicle over another.<sup>121</sup> Moreover, costs for insuring satellite launches can run so

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114. See Gifford, *supra* note 112.

115. See Official: *Impact of Delta Explosion Could be Felt Into Next Year*, DEFENSE DAILY, Jan. 29, 1997, available in 1997 WL 8105329 (quoting Frank Weaver, Associate Admin. for the Dept. of Tran. Commercial Space Office as saying that Delta-II launch failure will cause a four month setback in the Delta launch manifest).

116. See *Special Satellite '96*, *supra* note 112.

117. See Gifford, *supra* note 112.

118. See 1996 SLA Hearing, *supra* note 88, at 87 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (stating that Lockheed-Martin, a major launch service provider, offers Russian and United States launch vehicles with equal lift capacity and payload requirements to meet customer needs for quicker turnaround times and minimal delays).

119. See *supra* note 111 and accompanying text (discussing the effects of poor launch vehicle reliability on insurance rates); *Launch Capacity Report*, *supra* note 111 (reporting that despite the favorable investor views of the satellite industry, insurance costs associated with launch vehicle unreliability must be addressed). Simon Clapman, underwriter for Lloyd's of London, claims that the one-in-seven aggregate failure rate of launch vehicles is unacceptable to the insurance industry; indeed, insurance costs could threaten the satellite industry's future prosperity. See *id.*

120. See Gavin Souter, *New Heights for Satellite Risks: Rising Demand Will Test Capacity*, BUS. INS., March 11, 1996, available in 1996 WL 7532127 (stating that a 27% insurance rate was charged for an Asiasat satellite launched on the Long March rocket). Average insurance rates run from 14% to 20%. See *id.*

121. See Joseph Kahn, *Asiasat Chooses Russian Rocket Over Long March for Next Launch*, ASIA-PACIFIC NEWS, March 25, 1996, available in 1996 WL-WSJA 3330404 (stating that the increased insurance rates for China's Long March vehicle eliminated China's more attractive contract bid and made Russia's Proton

high as to exceed insurance underwriter capacity.<sup>122</sup>

Reliability, insurance, launch capacity, and scheduling difficulties in the launch services market place new launch competitors, regardless of national origin, at a big disadvantage because their transportation systems are untested.<sup>123</sup> Even with low rates, these newcomers will face difficulties in gaining market share.<sup>124</sup> China's failure to capture a larger portion of the launch vehicle market provides the best example.<sup>125</sup>

#### D. MARKET GROWTH AND FUTURE DEMAND

Current market forecasts predict that launch provider revenue over the next ten years will nearly double compared to the previous decade.<sup>126</sup> Satellite launch demand will surge as a result of significant growth in demand for commercial GEO and LEO communication satellites.<sup>127</sup> Estimated launch vehicle requirements for a broadband LEO satellite constellation<sup>128</sup> drives current "high growth models"<sup>129</sup>

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rocket the lowest bidder for the Asiasat satellite launch).

122. See Souter *supra* note 120 (stating that heavy launch vehicles such as the Ariane V rocket, with a potential to carry up to \$600 million in satellite hardware, could test the resources of insurance underwriters).

123. See *Satellite Owners Get Big Price Break from New Launch Suppliers*, SPACE BUS. NEWS, Jan. 8, 1997, available in 1997 WL 8214950 [hereinafter *New Launch Suppliers*] (stating that new suppliers from Japan, United States, and Ukraine need to prove boosters before they can gain market share).

124. See *id.* The minimum number of launches needed to establish a proven success rate is twenty. More importantly, there has never been a launch vehicle program that has not suffered a string of failures during its early years. Both the United States and European launch vehicles suffered multiple launch failures in the 1960s and 1980s, respectively. There is no reason to expect that newcomers will not face these same sorts of difficulties.

125. See discussion, *supra* Part I.B and accompanying notes 54-57 (discussing China's difficulties in gaining market, due to a series of launch failures and resulting exodus of insurers for the Long March); *supra* note 111 (discussing the effects of multiple failures on China's commercial launch service).

126. See Sparaco, *supra* note 89, at 1 (predicting that 1997-2006 revenues will be over \$34 billion, compared to \$18.3 billion for 1987-1996).

127. See *id.*; see also Tim Furniss, *Towards the Peak*, FLIGHT INT'L, July 17, 1996, available in 1996 WL 9460039 (stating that 65% of expected satellite launches from 1996-2004 will be commercial, half of them to LEO).

128. See Asker, *supra* note 92 (describing the high-data communication rates in the broadband Teledesic LEO system, a system requiring the launch from 840 to over 1,000 communication satellites). But see *Boeing Picked for 'Internet In the*



in the LEO marketplace.<sup>130</sup>

Market predictions of launch vehicle capacity have changed dramatically over the years. Early estimates predicted a sizable over-capacity in the market.<sup>131</sup> Today, the predicted near-term under-capacity will be followed by a severe glut.<sup>132</sup> Launch providers will argue that no near-term shortage of launch vehicles exists,<sup>133</sup> however, the current backlog of available launch vehicles<sup>134</sup> and increas-

*Sky*, WASH. POST, Apr. 30, 1997, at A1 (stating that Boeing negotiated a scaled-down version of Teledesic which would use only 288 satellites). The revised Teledesic requirements appear to show less demand for launch vehicles than what was previously expected; however, satellites in the revised network are launch vehicle payloads that are heavier and four-times more expensive and it appears that the 288 satellite constellation will be expanded once the system is operational. *See id.*

129. *LEO Commercial Market Projections* (visited Sept. 15, 1997) <<http://ast.dot.gov/reports/leo-c.pdf>> at 9 [hereinafter *1997 LEO Market Forecast*]. The Federal Aviation Administration bases predictions on three growth models, a "high growth", "modest growth" and "boundary condition" model. *Id.* The "boundary condition" model estimates the outer reaches of launch vehicle demand in the next nine years. *Id.* at 10.

130. The satellite systems driving launcher demand to GEO are not available. *See Report of the COMSTAC Technology & Innovation Working Group, Commercial Spacecraft Mission Model Update* (visited Sept. 15, 1997) <<http://ast.dot.gov/reports>> at 9 (providing a list of companies providing input to the market forecasts; however, COMSTAC maintains inputs as to each market forecast in strict confidence so as to not divulge investment strategies to competitors). The COMSTAC mission model provides market forecasts for launches to Geosynchronous Transfer Orbit (GTO), *see id.*, the most common orbital destination for a GEO launch vehicle's upper stage. A satellite transfers from GTO to GEO using an onboard propulsion system, or payload "kick motor".

131. *See ACCESS TO SPACE*, *supra* note 90, at 81 (stating that "[p]rojected launch services supply far exceeds expected [1990] demand").

132. *See 1997 LEO Market Forecast*, *supra* note 129, at Fig. 4 (illustrating the differences between the predicted launches from year-to-year. For example, compare the predicted 103 satellites launched in 1997, with a forecasted 31 launches in 1999). There is a high degree of uncertainty in predicting the peaks and valleys in launch vehicle demand. *Compare id.* (listing peaks and valleys in demand) with Sparaco, *supra* note 89, at 2 (stating that Euroconsult predicts a sharp rise in 1997-1998 followed by a glut in 2004-2005). *See also COMSTAC Mission Model of 1997*, *supra* note 130 (stating that planners cannot predict demands beyond five years. Furthermore, the report warns that predicted peaks and valleys could vary significantly from year-to-year).

133. *See Gifford*, *supra* note 112, at 1 (quoting ILS's President in response to claims of under-capacity in launch vehicles that "[t]o say that people can't get launches in the near term is not exactly true").

134. *See Established Launches Record a Banner Year in 1996*, SPACE BUS.

ing launch manifests<sup>135</sup> suggest that a significant undercapacity now exists and the potential effects on the commercial satellite business could be significant.<sup>136</sup>

The anticipated surge in satellite launcher demand has put increasing pressure on the United States "transitional" strategy in the launch services market.<sup>137</sup> The current debate centers on whether the launch agreements can accommodate changing market conditions or whether these trade instruments only serve to limit potential United States revenues in the satellite market.<sup>138</sup>

### III. THE SPACE LAUNCH AGREEMENTS

#### A. INCENTIVES BEHIND THE RUSSIAN, UKRAINE AND CHINESE SPACE LAUNCH AGREEMENTS

The space launch agreements serve the purpose of encouraging market reforms in non-market economies,<sup>139</sup> increasing business opportunities for United States Aerospace industries,<sup>140</sup> and protecting the United States launch industry from disruptive market practices.<sup>141</sup>

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NEWS, Jan. 8, 1997, *available in* 1997 WL 8214951 [hereinafter *1996 Banner Year*] (stating that Arianespace's Ariane 4 currently has a backlog of 41 satellites while McDonnell-Douglas's Delta II launch vehicle has a backlog of 38 satellites).

135. *See id.* at 1 (stating that in the United States alone, 18 launches were conducted in 1995, 25 launches in 1996, and 27 launches are predicted for 1997).

136. *See Launch Capacity Report, supra* note 111 (stating that launch vehicle capacity is critical to the continued success of the commercial satellite industry).

137. *See 1996 SLA Hearing, supra* note 88 (opening statement of Rep. Dave Weldon, Chairman of House Space and Aeronautics Subcomm.). Rep. Dave Weldon, Chairman of Space and Aeronautic Subcommittee, takes the view that our national priorities are often divergent from [the space commercialization goals of the next century] and even work against efforts of our commercial sector. We have policies that . . . promote unenforceable trade agreements with non-market economies and throw bureaucratic roadblocks in the way of commercial enterprises. . . . The international space launch trade agreements with China, Russia and Ukraine are a perfect example of this confused and divergent thinking. *See id.*

138. *See discussion, supra* Part III.D (discussing in detail the arguments lodged against the current launch agreements).

139. *See 1996 SLA Hearing, supra* note 88, at 50 (testimony of Catherine Novelli, Deputy Ass't United States Trade Representative for Eastern / Central Europe and Eurasia).

140. *See id.*

141. *See id.*

The agreements also serve a related foreign policy interest in reducing incentives for countries to engage in illicit dual-use technology exports.<sup>142</sup> The current debate focuses primarily on achieving United States's economic goals in the commercial space marketplace.<sup>143</sup>

### 1. *Missile Proliferation Concerns*

United States fears of missile proliferation through trade in space launch vehicle services<sup>144</sup> has not driven the debate since sanctions were lifted against GWIC in 1994.<sup>145</sup> This is not to say that trade in launch services does not continue to raise concerns of national security,<sup>146</sup> any trade in dual-use technologies is of constant concern. Space launch vehicles, in particular, pose a substantial risk of illicit use as there is little difference between a satellite launch vehicle and a transportation system for weapons of mass destruction.<sup>147</sup> It is suggested that nations will not necessarily invest in space launch services for the purpose of expanding domestic markets.<sup>148</sup> Rather, nations invest in the launch of satellites for the purpose of supporting

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142. See 1996 Ukraine Trade Agreement, *supra* note 8, at 6 (stating that as a prerequisite to entering into the treaty, the government of the Ukraine is required to fulfill its obligations in adhering to United States policies regarding the "[t]ransfer of missile equipment and technology"); discussion, *supra* Part I.B and accompanying notes (discussing United States requirements that China adhere to the MTCR as a prerequisite to entering into the commercial space launch market); discussion, *supra* Part I.D and accompanying notes (stating that the 1993 Russia Agreement was signed after Russia became a member of the MTCR). *But see* 139 CONG. REC. S10935, at S10935 (daily ed. Aug. 6, 1993) [hereinafter CONG. DEBATE] (statement of Sen. McCain) (asserting that the United States is supporting a military establishment by entering into launch agreements with countries like China).

143. See 1996 SLA Hearing, *supra* note 88, at 7 (opening statement of Rep. Ralph M. Hall).

144. See CONG. DEBATE, *supra* note 142 and accompanying text.

145. See discussion, *supra* Part I.B and accompanying notes (stating that after the Clinton Administration announced its 1994 Space Policy, no further sanctions were applied to China or the Russian Federation).

146. See CONG. DEBATE, *supra* note 142 and accompanying text.

147. See *id.* (stating that missile technology is indistinguishable from space launch vehicle technology).

148. See CONG. DEBATE, *supra* note 142 (arguing that there exists a strong potential for proliferation of missile technology by nations who invest in space technology but whose investments are not economically viable in the commercial sector).

the development of ballistic missile programs.<sup>149</sup>

## B. SUMMARY OF THE UNITED STATES' STRATEGY

The basic protective scheme for Western commercial launch vehicles relies on pricing guidelines and quantitative limits.<sup>150</sup> The agreements address satellite launch needs by providing provisions for increasing the launch quotas in the event of increased demand, and implementing flexible pricing guidelines.<sup>151</sup> While the terms of the agreement have changed somewhat since the 1989 China Agreement,<sup>152</sup> the same basic approach has been followed in subsequent agreements.<sup>153</sup>

## C. REGULATORY AUTHORITY AND THE TERMS OF THE LAUNCH AGREEMENTS

The launch agreements exclude launches for military or other governmental purposes and place restrictions on launches for international customers.<sup>154</sup> A notice of guidelines has been issued for the

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149. *Military Space Power*, *supra* note 29, at 182 (statement of Dr. Scott Pace, Policy Analyst, Critical Technologies Institute, The Rand Corp.) (stating that nations "seeking their own ballistic missiles have been tempted to offset development costs by offering 'commercial' launch services.").

150. See 1993 Russia Trade Agreement, *supra* note 7, arts. IV, V; 1995 China Agreement, *supra* note 9, arts. IV, V; 1996 Ukraine Trade Agreement, *supra* note 8, arts. IV, V; 1996 Russia Amendment, *supra* note 7, arts. IV, V.

151. See 1993 Russia Trade Agreement, *supra* note 7, arts. IV, V; 1995 China Agreement, *supra* note 9, arts. IV, V; 1996 Ukraine Trade Agreement, *supra* note 8, arts. IV, V; 1996 Russia Trade Agreement, *supra* note 7, arts. IV, V.

152. Compare 1989 China Agreement, *supra* note 37, art. V (stating that prices need to be roughly equivalent and setting a nine launch quota for a six year period) with 1995 China Agreement, *supra* note 9, arts. IV, V (setting a minimum price limit, Article IV, and increasing quotas from nine to fifteen, Article V, including an Annex of non-price factors, but otherwise maintaining the same pricing structure). The Russian and Ukraine agreements contain the same format as the 1995 China agreement. See 1993 Russia Trade Agreement, *supra* note 7, art. V; 1996 Russia Amendment, *supra* note 7, art. V; 1996 Ukraine Trade Agreement, *supra* note 8 art. V.

153. See *supra* note 152 (discussing the similar strategies employed in the 1993, 1995 and 1996 agreements).

154. See 1993 Russia Trade Agreement, *supra* note 7, arts. IV, V; 1995 China Agreement, *supra* note 9, arts. IV, V; 1996 Ukraine Trade Agreement, *supra* note 8, arts. IV, V; 1996 Russia Amendment, *supra* note 7, arts. IV, V (updating LEO

1989 China Agreement,<sup>155</sup> 1993 Russia Agreement,<sup>156</sup> and the 1995 China Agreement.<sup>157</sup> The guidelines set forth responsibilities of delegated interagency review committees and working groups as well as the means chosen for implementing and monitoring each of the separate agreements.<sup>158</sup>

### *1. Duties and Functions of the Lead Subcommittee*

The Trade Policy Staff Subcommittee on Space Launch Services (Subcommittee)<sup>159</sup> conducts ongoing assessments of the operation of

launching provisions).

155. See International Trade in Commercial Launch Services; Guidelines for Implementation of the Memorandum of Agreement With the People's Republic of China, 54 Fed. Reg. 4,931 (1989) [hereinafter 1989 China Agreement Guidelines].

156. See Guidelines for United States Implementation of The Agreement Between the United States and Russian Federation Regarding International Trade in Commercial Space Launch Services, 59 Fed. Reg. 11,360 (1994) [hereinafter 1993 Russia Trade Agreement Guidelines].

157. See International Trade in Commercial Space Launch Services: Guidelines for Implementation of the Memorandum of Agreement With the People's Republic of China, 60 Fed. Reg. 20,796 (1995) [hereinafter 1995 China Agreement Guidelines]. The 1995 China Agreement Guidelines, the most recent statement on the United State's implementation of the Space Launch Agreements, will be the primary source for the discussion of administrative functions relating to the agreements. The 1993 Russian Agreement Guidelines will be referenced when terms and provisions peculiar to the United States-Russia agreements are discussed. The guidelines are approved by the Trade Policy Staff Committee (Trade Committee) and The Office of The United States Trade Representative (USTR). See *id.* at 20,796. The authority for monitoring the agreements is vested in the Subcommittee for Space Launch Services, chaired by the USTR. See *id.* The Subcommittee Working Group on Information, chaired by the Department of Transportation, is responsible for data collection. See 1989 China Agreement Guidelines, *supra* note 155, at 4,932; 1993 Russia Trade Agreement Guidelines, *supra* note 156, at 11,361-62; 1995 China Agreement Guidelines, *supra* note 157, at 20,796.

158. See 1995 China Agreement Guidelines, *supra* note 157, at 20,797; 1993 Russia Trade Agreement Guidelines, *supra* note 156, at 11,361-62. Since the guidelines for the implementation of the 1996 Russia Amendments and the 1996 Ukraine Agreement have not yet been issued, the administrative functions and methodologies discussion herein are primarily based on the guidelines issued pursuant to the 1993 Russia Agreement and 1995 China Agreement. The author assumes that the guidelines associated with the 1996 agreements will not differ significantly from the 1993 and 1995 guidelines.

159. See *supra* note 157 (discussing the responsibilities and inter-agency representatives comprising the Subcommittee).

each agreement relative to United States goals<sup>160</sup> and ensures compliance by providers based in non-market economies.<sup>161</sup> The Subcommittee performs these functions by gathering data on industry developments,<sup>162</sup> exchanging pricing data on satellite launches<sup>163</sup> and

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160. See 1995 China Agreement Guidelines, *supra* note 157, at 20,796. The United States goals and objectives under the agreement are four-fold:

Continuing the integration of [Chinese] launch services providers into the international market on a non-disruptive basis; (ii) providing a stable international environment within which United States space launch companies can compete on a fair basis while [Chinese] launch service providers continue their transition to fully absorb the disciplines of the marketplace (costs, prices, profits); (iii) ensuring that administration of the Agreement responds to changing conditions so as to support the continued success in the international commercial marketplace of all segments of the United States space industry, i.e., space launch companies, satellite manufacturers, and system operators; and (iv) avoiding shortages of space launch capability that would prevent the development of new uses of space.

*Id.*

161. See 1995 China Agreement Guidelines, *supra* note 157, at 20,796. The Subcommittee is to monitor Chinese compliance with the terms of the treaty by "assessing information relevant under the treaty" for launches and market participation. See *id.*

162. See *id.* at 20,796-97 (describing how the working group gathers information on a continual basis and presents forecasts on market developments). The Federal Aviation Administration publishes and receives annual market forecasts as part of its data collection duties. See *LEO Commercial Market Projections*, <<http://ast.dot.gov/reports>> (visited Sept. 15, 1997) [hereinafter *1997 LEO Market Forecast*]; *Report of the COMSTAC Technology & Innovation Working Group : Commercial Spacecraft Mission Model Update*, <<http://ast.dot.gov/reports>> (visited Sept. 15, 1997) [hereinafter *COMSTAC Mission Model*]. The 1995 China Agreement guidelines describe far more extensive data collection duties and other market-related duties of the working group, as well as greater recognition of market needs, than the 1993 Russian Agreement Guidelines. Compare 1995 China Agreement Guidelines, *supra* note 157, at 20,796 (listing strong concerns against artificially restraining market forces while describing continual efforts to update market predictions and adjust quota provisions when the market changes) with 1993 Russia Trade Agreement Guidelines, *supra* note 156, at 11,361 (providing only very cursory information on the duties and activities of the Subcommittee, and offering little more than a restatement of the treaty).

163. See 1995 China Agreement, *supra* note 9, art. II (describing data exchange protocol with non-market national representatives and industry). The agreements state that there "shall be" an open data exchange on pricing and costs for commercial launch services offered. See 1993 Russia Trade Agreement, *supra* note 7, art. VIII; 1995 China Agreement, *supra* note 9, art. VIII; 1996 Ukraine Trade Agreement, *supra* note 8, art. VIII. If the requested pricing data contains business proprietary information, the information need only be in summary form. See 1995

consulting with industry and non-market nations representatives.<sup>164</sup>

## 2. *Cooperation Between the Subcommittee and Affected United States Industries*

Pursuant to United States' goals,<sup>165</sup> the Subcommittee must accommodate the needs of both the satellite and launch vehicle industries.<sup>166</sup> One important way in which it does this is to monitor compliance with the launch agreements. The Subcommittee works towards accommodating the needs of the launch industry by scrutinizing the terms and conditions of a launch contract,<sup>167</sup> including identifying prohibited inducements,<sup>168</sup> unauthorized government sup-

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China Agreement, *supra* note 9, art. VIII; 1996 Ukraine Trade Agreement, *supra* note 8, art. VIII; 1996 Russia Amendment, *supra* note 7, art. VIII.

164. See 1995 China Agreement, *supra* note 9, art. VII; 1996 Ukraine Trade Agreement, *supra* note 8, art. VII; 1996 Russia Amendment, *supra* note 7, art. VII. The agreements call for annual government consultations with a comprehensive review every three years. See *id.* The Subcommittee solicits information from the United States launch vehicle and satellite industries prior to consultations. See 1995 China Agreement Guidelines, *supra* note 157, at 20,797. Consultation is also needed if there has been a significant change in market demand or there are problems with a party's compliance with the terms of the agreement. See 1995 China Agreement, *supra* note 9, art. VII; 1993 Russia Trade Agreement, *supra* note 8, art. VII; 1996 Ukraine Trade Agreement, *supra* note 8, art. VII.

165. See *supra* note 160 and accompanying text (outlining the United States goals).

166. See generally 1995 China Agreement Guidelines, *supra* note 157, at 20,796 (stating the goals of achieving fair trade in the launch vehicle industry while recognizing the needs of the satellite market).

167. See 1993 Russia Trade Agreement, *supra* note 7, art. III; 1996 Ukraine Trade Agreement, *supra* note 8, art. III; 1995 China Agreement, *supra* note 9, art. III.

168. See 1993 Russia Trade Agreement, *supra* note 7, art. I (defining the term "inducements" as "any incentive offered or provided to influence the purchase of a commercial launch service including, but not limited to, the provision of any resource unrelated to the launch service competition"); 1996 Ukraine Trade Agreement, *supra* note 8, art. II (defining "inducements" as "unreasonable political pressure, the provision of any resources of commercial value unrelated to the launch service competition and offers of favorable under or access to defense and national securities policies and programs, development assistance policies and programs, and general economic policies and programs"); 1995 China Agreement, *supra* note 9, art. II (agreeing that neither China nor the United States will give "inducements of any kind in connection with the provision of commercial launch services").

port or financing,<sup>169</sup> and unfair business practices.<sup>170</sup>

The needs of satellite vendors or satellite operators are addressed by preventing any unintended effects on supply and demand as a result of the trade agreements.<sup>171</sup> These potential market influences may lie in the trade agreement's distinctions drawn between GEO and LEO launches,<sup>172</sup> the effect of quotas on multiple payload launches or future proposals for satellite launch systems,<sup>173</sup> and shortages of Western launch vehicles.<sup>174</sup>

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169 See 1993 Russia Trade Agreement, *supra* note 7, art. III (stating that non-market countries are required to refrain from government financing of launch vehicles or services except in accord with the terms of the Organization for Economic Cooperation and Development (OECD) Arrangement on Guidelines for Officially-Supported Export Credits).

170. See 1993 Russia Trade Agreement, *supra* note 7, art. I (stating that the term "unfair business practices" includes the making of any offer" to a government official for "purposes of obtaining or retaining business"); 1996 Ukraine Trade Agreement, *supra* note 8, art. II (defining "unfair business practices" as "the making of any offer" to a government official "for the purpose of obtaining or retaining business"); 1995 China Agreement, *supra* note 9, art. II (stating that any direct or indirect government support will be "in accord with practices prevailing in the international market").

171. See 1995 China Agreement Guidelines, *supra* note 157, at 20,796 (stating that the market, rather than the agreements themselves, should dictate the course of commercial space ventures).

172. See generally *id.* at 20,796-97 (stating that the Subcommittee will monitor the agreement "carefully so as to ensure that the Agreement does not create an artificial advantage for business proposals simply by virtue of the orbit of the satellites that provide the service").

173. See generally *id.* at 20,797 (recognizing that potential business proposals will be evaluated and may lead to a modification of the launch quotas).

174. See *id.* at 20,798-99. In determining that there is a lack of available Western launch vehicles, the 1995 China Agreement Guidelines require the satellite customer to meet the following four requirements:

- (1) A statement certifying that the . . . international customer . . . has contacted all launch service providers with a technically compatible vehicle, including all such domestic launch service providers;
- (2) A statement certifying that the . . . international customer . . . [has contacted the Chinese government and there is a launch slot available];
- (3) A statement that the [Chinese] launch service provider is the only launch service provider that is available . . . ;
- (4) A statement that the certifying official is a certifying official of the certifying entity and is familiar with and responsible for the negotiations regarding the proposed launch based on information and belief.

*Id.*



### 3. Monitoring and Enforcement of The Agreements

The Russia, China, and Ukraine launch agreements require flexible pricing and quota guidelines.<sup>175</sup> Launch quotas depend on market developments.<sup>176</sup> The pricing guidelines serve as a method for revealing questionable market bids. If the contract bid falls more than fifteen percent below a comparable Western launch bid, the Subcommittee will first consider whether non-price factors justify the price difference.<sup>177</sup> Non-price factors include risk management,<sup>178</sup>

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175. See generally 1996 SLA Hearing, *supra* note 88, at 48 (testimony of Donald W. Eiss, United States Trade Representative for Industry and Labor) (arguing that the pricing and quota guidelines need to be flexible because the market is difficult to predict).

176. See 1995 China Agreement, *supra* note 9, art. IV; 1996 Ukraine Trade Agreement, *supra* note 8, art. V; see also 1996 Russia Amendment, *supra* note 7, art. V (stating that if there are favorable changes in launch vehicle demand, either by current market conditions or through the parties mutual belief that launch vehicle demand increase is imminent, the parties can increase launch quotas, following special consultations). The agreements also recognize potential future satellite proposals which could radically change market demands and lead to favorable reconsideration, if not elimination of launch restrictions. See *id.*

177. See 1995 China Agreement Guidelines, *supra* note 157, at 20,799 (stating that when a bid falls below the pricing threshold of 15%, the Subcommittee will look at the non-price factors set forth in the Annex of the agreements). Each of the currently active agreements contains a list of factors that enter into a contract price for launch services. See 1995 China Agreement, *supra* note 9, art. II; 1996 Ukraine Trade Agreement, *supra* note 8, art. VIII (3); 1996 Russia Amendment, *supra* note 7, art. VIII (3). The non-price factors are intended to offset the significant differences between Western and non-market economy launch provider services and the varied nature of satellite mission requirements. See 1995 China Agreement, *supra* note 9, art. VIII (Annex). The 1995 China Agreement identifies six non-price factors: (1) Intended Orbit, *see id.* (distinguishing launch contracts that provide orbit insertion at the desired perigee from satellites which use their own perigee kick-motors); (2) Risk Management, *see id.* (addressing the sometimes substantial differences between Western and non-market nations launch insurance premiums); (3) Integration Costs-Launch Support, *see id.* (referring to complexities unique to Chinese launches, for example, cumbersome technology transfer restrictions, transportation costs, and cost of integrating different technologies); *see also* 1989 China Tech Tran Agreement, *supra* note 35 (outlining security requirements for launching in China); Memorandum of Agreement on Satellite Technology Safeguards between the Governments of The United States of America and The People's Republic of China, February 11, 1993, U.S.-PRC, State Dept. 93-56 (enforced Feb. 11, 1993) [hereinafter 1993 China Tech Tran Agreement] (updating the 1989 technology transfer agreement); (4) Required Vehicle Payload Lift Capability (ensuring that any price comparison will be between vehicles which have the

launch vehicle insurance,<sup>179</sup> differences in launch technology and mission requirements.<sup>180</sup> If the non-price factors do not justify the contract underbid, the Subcommittee will engage in special consultation with the non-market national representative.<sup>181</sup> If there is no satisfactory resolution, the Subcommittee can ask the USTR to initiate a formal Section 301 investigation.<sup>182</sup>

The launch agreements do not alter the USTR's Section 301 investigatory powers<sup>183</sup> under the United States Trade Act of 1974.<sup>184</sup>

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same lift and orbit insertion requirements), *see* 1995 China Agreement, *supra* note 9, art. VIII (Annex); (5) Payment Conditions and Terms, *see id.* (referring to different forms of compensation which may not be reflected in the contract price); and (6) Lifetime, *see id.* (referring to satellite structural fatigue or outright failures which may occur as a result of, or during ascent into orbit).

178. *See supra* note 177; *see also* discussion, *supra* Part II.C and accompanying notes (describing the risks associated with launch vehicle reliability); discussion, *supra* Parts I.B, I.D (describing the political climate surrounding satellite export licenses to non-market nations).

179. *See supra* note 177 and accompanying text (including insurance costs within the launch vehicle cost); discussion, *supra* Part II.C (describing the extreme importance of establishing good launch records to minimize the launch insurance premiums that can be as much as 27% of the coverage price).

180. *See supra* note 177 and accompanying text (noting that the differences in technology between non-market and Western economies are not reflected in contract prices).

181. *See* 1995 China Agreement, *supra* note 9, art. IV; 1996 Russia Amendment, *supra* note 7, art. VII; 1996 Ukraine Trade Agreement, *supra* note 8, art. VIII.

182. *See* 19 U.S.C. § 2411 (1994) (describing general authority of the USTR). *See generally supra* note 63 and accompanying text (giving reason for § 2411 reference to Section 301 sanctions). The USTR, in order to force an offending party to comply with fair trading practices, can:

(A) suspend, withdraw, or prevent the application of, benefits of trade agreement concessions to carry out a trade agreement with the foreign country referred to in such subsection;

(B) impose duties or other import restrictions on the goods of, and, notwithstanding any other provision of law, fees or restrictions on the services of, such foreign country for such time as the Trade Representative determines appropriate.

19 U.S.C. § 2411 (c) (1) (1994).

183. The agreements expressly provide that the United States retains all powers granted by domestic and international laws. *See* 1993 Russia Trade Agreement, *supra* note 7, art. VI; 1995 China Agreement, *supra* note 9, art. V; 1996 Ukraine Trade Agreement, *supra* note 8, art. VII; *see also* 1996 SLA Hearing, *supra* note 88, at 49 (statement of Donald W. Eiss, United States Trade Representative for Industry and Labor) (arguing that the United States can take unilateral action unre-

This legal authority might seem like an important part of the enforcement process, nevertheless, no Section 301 investigation has yet taken place.<sup>185</sup> Some members of the launch vehicle industry ask the United States to take a more active role in enforcing fair trade through Section 301 sanctions,<sup>186</sup> while the satellite industry supports trade sanctions only if there is clear evidence of a trade agreement violation.<sup>187</sup> The difference of opinion lies in whether the USTR, or industry should take responsibility for establishing proof of a trade violation.<sup>188</sup>

Current quotas set limits on the number and frequency of GEO launches by Russia,<sup>189</sup> Ukraine,<sup>190</sup> and China.<sup>191</sup> The quotas can

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stricted by the terms of the agreements); 1995 China Agreements Guidelines, *supra* note 157, at 20,798 (stating that the Subcommittee will recommend whether the USTR should undertake a formal Section 301 investigation).

184. See 19 U.S.C. § 2411 (1994).

185. See generally discussion, *supra* Part I.B and accompanying notes (discussing how the USTR refused to take actions against China at the request of Arianespace for the Arabsat satellite launch bid); discussion, *supra* Part I.C and accompanying notes (stating that the USTR refused to take action against Arianespace in 1985 because the United States uses subsidies for the commercial shuttle program).

186. See 1994 Global Trade Hearing, *supra* note 32, at 121 (testimony of R. Grabe, Vice President Orbital Sciences Corp.) (asking that the United States begin to seriously take a look at enforcing the launch agreement pricing provisions by using Section 301 procedures).

187. See *id.* at 72 (statement of Bary Bertiger, Corporate Vice President and Assistant Gen. Manager, Satellite Communications Division of Motorola) (stating that Section 301 sanctions are needed; however, the United States should initiate proceedings only when the moving party provides clear evidence that there has in fact been a violation). Mr. Bertiger argues that launch service complainants, not satellite manufacturers, should bear the burden of showing a trade violation. See *id.* By placing the burden on a moving party, satellite export licensing delays, associated with requiring the USTR to certify compliance, would be avoided. See *id.*; *The Export Administration Act of 1994: Hearings Before the Subcomm. on Int'l Fin. and Monetary Policy of the Senate Comm. on Banking, Housing, and Urban Affairs*, 103d Cong. 73 (1994) (statement of Henry D. Sokolski, Fellow, National Institute for Public Policy) (describing the efforts of industry to avoid delays in government issuance of export licenses when trade issues are investigated by entities including the State Department and the USTR).

188. See *id.*

189. See 1996 Russia Amendment, *supra* note 7, art. IV (listing quota provisions and outlining the "non-bunching" requirement over a seven-year period).

190. See 1996 Ukraine Trade Agreement, *supra* note 8, art. V (stating quota provisions and outlining the "non-bunching" requirement over a seven-year pe-

change, depending on market developments.<sup>192</sup> Quota provisions are evaluated by use of market forecasts.<sup>193</sup>

#### 4. Restrictions on LEO Launches

The agreements also place quotas on individual LEO satellite launches;<sup>194</sup> however, neither quotas nor pricing guidelines for launches of LEO satellite constellations are clearly defined due to market uncertainties.<sup>195</sup> Instead, the agreements require that the sum

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riod). The Ukraine agreement sets forth quota provisions that distinguish between launches made by United States-Ukraine joint ventures versus launches by Ukraine launch providers. *See id.*

191. *See* 1995 China Agreement, *supra* note 9, art. II(B) (stating quota provisions and outlining the "non-bunching" requirement over a seven-year period).

192. *See* 1996 Russia Amendment, *supra* note 7, art. IV. Launch quota allotments may be increased pursuant to the agreements, if the overall market grows at a certain specified rate, or if the United States and the respective nation mutually agree that a general increase in launch capacity is likely. *See id.*; 1996 Ukraine Trade Agreement, *supra* note 8, art. II (B); 1995 China Agreement, *supra* note 9, art IV (4).

193. *See* 1995 China Agreement Guidelines, *supra* note 157, at 20,797 (stating that the United States will assess whether market conditions warrant increasing quotas); *see generally* COMSTAC Mission Model, *supra* note 162 (giving an example of market forecasts for launch vehicles serving the GEO satellite market).

194. *See* 1996 Russia Amendment, *supra* note 7, art. IV (3) (stating that Russia is limited to three LEO satellite launches which are not part of the initial deployment of the satellite constellation); 1996 Ukraine Trade Agreement, *supra* note 7, art. V (2) (stating that the Ukraine is governed by the terms of the GEO launch quota provisions for single LEO satellites not part of the LEO satellite constellation initial deployment). *But see* 1995 China Agreement, *supra* note 9, arts. II-V (showing no similar provisions for Chinese launches of LEO satellites). The 1995 China Agreement does not contain any quotas for LEO satellite launches because at that time, the market for LEO satellites was too uncertain. *See* 1995 China Agreement, *supra* note 9, art. II (B) (iii) (b) (stating that the "United States recognizes that the participation of [Chinese] launch services in [the LEO] market could be substantial").

195. *See generally* 1997 LEO Market Forecast, *supra* note 162, at 3 (illustrating how the LEO market is highly uncertain and could adversely affect the launch vehicle requirements, depending on which proposals are actually implemented); *supra*, Part II.D and accompanying notes (describing how the evolving market for LEO constellations could radically change launch vehicle demand); 1996 Russia Amendment, *supra* note 7, art. IV (3) (describing how market uncertainties can have a dramatic effect on the pricing and quota provisions for LEO satellite launches). The 1996 Ukraine Trade Agreement and 1996 Russia Amendment contemplate that in the course of ascertaining the market for LEO satellite launch vehicles, the parties may determine that current events would "justify favorable

total participation in the deployment of a LEO satellite system by non-market nations not be greater than the participation by the West.<sup>196</sup> In order to avoid unintended effects on the course of business, assessments of compliance with the LEO deployment guidelines also consider scheduling, availability, and customer requirements.<sup>197</sup>

LEO launch restrictions impose the biggest challenge to the drafters of the bilateral trade agreements.<sup>198</sup> The "loose" LEO guidelines reflect an inability of the parties to reach a mutual understanding on the needs of the LEO market.<sup>199</sup> United States representatives hope that by continually monitoring market developments, the guidelines will be effective in maintaining a proportionate United States market share in launch services without debilitating United States satellite manufacturers and operators' competitive position in the marketplace.<sup>200</sup>

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reconsideration for elimination of the criteria." 1996 Ukraine Trade Agreement, *supra* note 8, art. V (3); *see* 1996 Russia Amendment, *supra* note 7, art. IV (3). "[A] commercially viable project for satellite services that fundamentally changes demand for launch services," could qualify for such favorable reconsideration. 1996 Ukraine Trade Agreement, *supra* note 8, art. V (3); 1996 Russia Amendment, *supra* note 7, art. IV (3).

196. *See* 1996 Russia Amendment, *supra* note 7, art. V (1); 1996 Ukraine Trade Agreement, *supra* note 8, art. V (3). The pricing guidelines for LEO orbits simply require non-market nation bids to be comparable to Western launch providers, with launches of LEO satellite deployments considered on a "case-by-case" basis. *See id.*

197. In assessing guideline compliance, the Subcommittee can take into account the following factors: "launch scheduling requirements . . . the availability of competitively priced market economy launches . . . opportunities made available to other parties for participation in the replacement market; reasonable considerations by the proposed system operator regarding commercial risk sharing; and, customers' requirements." 1996 Ukraine Trade Agreement, *supra* note 8, art. V (3).

198. *See generally* 1996 SLA Hearing, *supra* note 88, at 52 (statement of Donald W. Eiss, United States Trade Representative for Industry and Labor, and Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern / Central Europe and Eurasia) (noting that the administration has yet to specify pricing and quota provisions for the LEO market due to a lack of knowledge and experience in that market).

199. *See id.* and accompanying text.

200. *See generally id.* (noting that the administration is committed to developing a workable set of guidelines as satellite ventures unfold in the LEO market); *supra* note 160 and accompanying text (listing the goals of ensuring minimal market disruption, letting the market decide which commercial satellite ventures are viable

### 5. Technology Transfer Safeguards

The United States tightly controls satellite exports because most satellites or their components are classified as dual-use technologies.<sup>201</sup> The launch agreements state that all exports of United States satellites will be determined on a "case-by-case basis"<sup>202</sup> with no effect on the sovereign authority to issue export licenses.<sup>203</sup> The authority to issue licenses is vested in the State Department.<sup>204</sup> The granting of an export license is contingent on the importing nation establishing a technology control plan.<sup>205</sup> These control plans differ in scope, depending on whether the satellite is launched by a Chinese, Russian, or Ukrainian launch service provider.<sup>206</sup>

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and not creating artificial distinctions between satellite ventures solely based on the intended orbit).

201. See 1994 *Global Trade Hearing*, *supra* note 32, at 29 (testimony of Dr. Martha Caldwell Harris, Deputy Assistant Secretary for Export Controls, Bureau of Political-Military Affairs (arguing that satellites use technologies which can be easily converted into applications which would threaten national security). Dr Harris argues that the risks associated with exporting satellite technology requires the State Department to maintain control over export licenses. See *id.*

202. See 1993 Russia Trade Agreement, *supra* note 7, art. VI (2); 1995 China Agreement, *supra* note 9, art. V (2); 1996 Ukraine Trade Agreement, *supra* note 8, art. VII (3).

203. See *id.* (stating that "nothing in this agreement shall be construed to mean that the United States is constrained from taking appropriate action with respect to any United States export license").

204. See *supra* note 202, and sources cited therein; see also 1995 China Agreement Guidelines, *supra* note 157, at 20,798 (stating that the Subcommittee shall supply the Department of State information on the implementation of the agreement as it would pertain to the Secretary of State's duties in licensing satellite exports).

205. See 1993 Russia Trade Agreement, *supra* note 7, art. VI (1); 1993 China Tech Tran Agreement, *supra* note 177; 1996 Ukraine Trade Agreement, *supra* note 8, art. VII (1)-(2).

206. The United States imposes far more stringent technology transfer safeguards on China than Russia or the Ukraine. Compare 1993 Russia Trade Agreement, *supra* note 7, art. VI (1) and 1996 Ukraine Trade Agreement, *supra* note 8, art. VI (stating that prior to launches parties must put forward a technology control plan) with 1993 China Tech Tran Agreement, *supra* note 177 (listing requirements for any export of United States satellite technology to China, including stringent restrictions on technical data, badge access controls, electronic monitoring, independent facilities for United States personnel, transportation, and other requirements). The nature of relations with Russia verses China account for these differences in technology transfer safeguards. Compare discussion, *supra* Part I.D and accompanying notes (describing how trade and joint business ventures are encour-

## 6. Distinctions Between Russian Federation and Chinese Launch Providers

China's launch industry remains relatively isolated<sup>207</sup> and offers a limited capability in launch vehicles.<sup>208</sup> In contrast, the Russian Federation's participation in the launch services market is highlighted by international joint ventures,<sup>209</sup> in particular Ukraine's joint venture with Boeing Aerospace,<sup>210</sup> and a wider variety of space launch services.

The 1993 Russia Agreement addresses the greater capabilities of Russian booster vehicles by placing special quota provisions for dual-payload launches,<sup>211</sup> and including Russian-built satellites that are leased to international customers in the trade agreement's pricing and quota provisions.<sup>212</sup> The Ukrainian Agreement draws distinctions

aged with Russia and other Russian Federation member states) and 1993 Russia Trade Agreement, *supra* note 7, art. I (stating that the agreement is reached in the interests of joint exploration of space) and *United States Nonproliferation Policy 1993: Hearing Before the House Comm. on Foreign Affairs*, 103d Cong. 2 (1993) (statement of Lynn E. Davis, Undersecretary of State for International Security Affairs) (describing the advancements in Russia-United States relations regarding ballistic missile threats); with discussion, *supra* Part I.B (listing the many export sanctions imposed on China and the United States' reaction to the 1989 Tiananmen Square incident), and the regulation of trade with China. *See supra*, note 44 and accompanying text (stating that satellites may be exported to China only if the president finds that the exports are (1) in the national interests or (2) China has achieved human rights reform).

207. *See* Covault, *supra* note 61, at 1 (remarking that China's interest in pursuing international cooperation in Aerospace is a break from the past).

208. *See* Tim Furness, *Mass Defections*, FLIGHT INT'L, Apr. 3, 1996, available in 1996 WL 9459951 (stating that even in the best of times China could only launch five satellites per year, which is far below the capabilities of the established launch providers).

209. *See supra* notes 87-89 (discussing the joint ventures formed between the West and the Russian and Ukrainian launch service providers).

210. *See supra* notes 88-89 (describing the "Sea Launch" joint venture as well as other Ukraine joint ventures with Western partners).

211. 1993 Russia Trade Agreement, *supra* note 7, art. IV; 1996 Russia Amendment, *supra* note 7, art. IV; 1996 Ukraine Trade Agreement, *supra* note 8, art. IV. The distinctions between "principal" and "dual-payload" launches, reflect the medium and heavy lift capabilities of Russian launch vehicles. *See id.*

212. *See* 1993 Russia Trade Agreement, *supra* note 7, art. IV; 1996 Russia Amendment, *supra* note 7, art. IV; *see also* 1993 Russia Agreement Guidelines, *supra* note 156, at 11,361 (stating that there is no difference between the launch of a Western-built satellite for an international customer and a Russian built satellite

between domestic launches<sup>213</sup> and launches via an "integrated space launch service provider."<sup>214</sup> For domestic launches, the usual pricing and quota provisions apply.<sup>215</sup> Launches undertaken by a joint venture, however, need to meet special qualifications<sup>216</sup> before the joint venture may receive the more favorable quota allotment of an "integrated launch service provider."<sup>217</sup> These special requirements for Russian and Ukrainian launchers suggest that the agreements serve the purpose of limiting participation where market guidelines do not provide adequate assurances against predatory pricing. Without an ability to impose more explicit agreements on trading practices, the United States resorts to trade agreements that place artificial barriers in the marketplace.

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which is leased to an international customer).

213. See 1996 Ukraine Trade Agreement, *supra* note 8, art. II (2) (defining a "Ukrainian launch service provider" as any entity acting on behalf of the Ukraine); *id.*, art. V (1) (listing special quotas imposed on a Ukrainian launch service provider).

214. See 1996 Ukraine Trade Agreement, *supra* note 8, art. II (2) (defining an "integrated launch service provider" as any joint venture between a United States and Ukrainian company in the field of rocket and space technology). In order to qualify as an "integrated launch service provider", a venture must obtain "a commercial launch license issued by the United States Department of Transportation," while a "U.S. partner maintains a significant equity interest in, and control in fact . . . and the U.S. is the source of a significant share of the goods and services. . . ;" and the "majority of the goods and services utilized . . . in any space launch have their origin in market-economy countries." *Id.*

215. See 1996 Ukraine Trade Agreement, *supra* note 8, art. V. The 1996 Ukraine Trade Agreement applies the same market participation guidelines to a "Ukrainian launch service provider" as a Russian launch service provider or a Chinese launch service provider. See 1993 Russia Trade Agreement, *supra* note 7, art. V; 1996 Russia Amendment, *supra* note 7, art. V; 1995 China Agreement, *supra* note 9, art. V.

216. See *supra* note 214 and accompanying text (describing the prerequisites for "integrated launch service provider" status).

217. See 1996 Ukraine Trade Agreement, *supra* note 8, art. V. "Ukrainian space launch services" may provide from five to six GEO launches for international customers. *Id.* art. V(1). In contrast, Ukrainian space launch vehicles supplied to an "integrated space launch services provider" can range from ten to fourteen space launch vehicles. See *id.*



#### D. DIFFICULTIES IN MAINTAINING NEGOTIATED TRADE AGREEMENTS IN THE LAUNCH VEHICLE MARKETPLACE

The usefulness of the launch trade agreements in effectively promoting a market-orientated commercial launch services environment is the focus of heated debates.<sup>218</sup> Disagreement focuses upon the use of launch quotas and pricing guidelines.<sup>219</sup> Industry criticisms of the pricing guidelines and launch quotas are not new.<sup>220</sup> However, demands from a growing space market since 1994 have spurred greater criticism of the launch agreements.<sup>221</sup>

##### *1. An Overview of The Launch Agreement Debate*

Controversy over the launch agreements is polarizing the respective commercial space interests of the satellite and launch vehicle industries.<sup>222</sup> Greater launcher availability benefits the satellite industry

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218. See generally 1996 SLA Hearing, *supra* note 88 (collecting a variety of criticisms of the space launch agreements); *supra* note 137 and accompanying text (citing Rep. Weldon's view that the space launch agreements serve to frustrate the Clinton Administration's space commercialization policy).

219. See *id.*; 1996 SLA Hearing, *supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (arguing against restrictions placed on Russian launch vehicles); *id.* at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (arguing for more restrictions on non-market economy launch providers); 1994 Global Trade Hearing, *supra* note 32 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (arguing against restrictions on non-market economy launch providers).

220. See 1988 Space Roundtable, *supra* note 39 (debating whether the pricing and quota provision strategies in the space launch agreements really serve the goals of promoting United States commercial interests in the satellite and launch service industries).

221. See Randy Ridley, *The Battle for the Launch Pad*, SATELLITE COMM., June 1, 1994, available in 1994 WL 13599777 (implying that the growing market for space launch vehicles has lead to increased criticisms of the trade agreements); *The Launch Market in '94 and Beyond*, SATELLITE NEWS, Jan. 3, 1994, available in 1994 WL 2458886 (stating that increasingly crowded launch manifests have lead to sharper industry complaints of the limits placed on less expensive and available non-market economy launch vehicles).

222. Compare 1994 Global Trade Hearing, *supra* note 32, at 57-58 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (stating that launch quotas should be lifted) with 1996 SLA Hearing, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (arguing that launch quotas should be enforced).

in terms of cost,<sup>223</sup> capacity,<sup>224</sup> and scheduling of launch vehicles,<sup>225</sup> but forces the United States launch services industry to compete directly with government-subsidized competitors.<sup>226</sup> Despite efforts to reach acceptable compromise, an industry consensus regarding the agreements has not been forthcoming. The satellite industry sees them as overly protective of Western launch providers,<sup>227</sup> while the launch service industry desires greater protections.<sup>228</sup>

The launch and satellite industry do share some common complaints. First, the distinctions that the agreements draw between LEO and GEO launch pricing and quota provisions ultimately manipulate and distort market forces in these distinctive markets.<sup>229</sup> Second, both

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223. See *1994 Global Trade Hearing*, *supra* note 32, at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (stating that by offering a wider choice in launch vehicles, satellite customers can seek out the best prices); *id.* at 64 (testimony of Robert E. Berry, President Space Systems/Loral) (stating that in order to lower costs for placing a satellite into orbit, the satellite industry needs to not only lower costs for satellites, but for launch vehicles as well).

224. See *1996 SLA Hearing*, *supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (stating that satellite customers need greater launch vehicle capacity).

225. See *1994 Global Trade Hearing*, *supra* note 32, at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (stating that the unreliability of launch vehicles requires satellite customers to spread out launches on multiple launch vehicles).

226. See *1996 SLA Hearing*, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (stating that by lifting launch quotas and price restraints, the launch industry is forced to compete with non-market providers using unlimited government resources).

227. See *1994 Global Trade Hearing*, *supra* note 32, at 64 (testimony of Robert E. Berry, President Space Systems/Loral) (stating that the United States policies are too protective of the launch industry as they reduce incentives for cost reductions and developments in new technologies).

228. See *1996 SLA Hearing*, *supra* note 88 (opening statement of Rep. Dave Weldon, Chairman of House Space and Aeronautics Subcomm.) (stating that the pricing provisions should be more strictly enforced).

229. See *1994 Global Trade Hearing*, *supra* note 32, at 121 (testimony of R. Grabe, Vice President Orbital Sciences Corp.) (stating, from the perspective of a launch service provider of LEO satellites, that non-market economies should be held to the same pricing and quota provisions in the LEO market as in the GEO market); *id.* at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (stating, from the perspective of a satellite manufacturer, that the LEO/GEO distinctions should be eliminated as they distort supply and demand). *But see id.* at 72 (statement of Bary Bertiger, Corporate Vice Pres. and Assistant General Manager, Satellite Communications Division of Motorola) (stating, from

parties claim that quota provisions will quickly become unmanageable in the face of an increasing number of international launch service providers.<sup>230</sup> Third, although the launch agreements manifest a goal of establishing a "level playing field,"<sup>231</sup> they fail to control the business practices of Arianespace--the United States' biggest competitor in launch services.<sup>232</sup> These multi-faceted set of criticisms suggest that the growing market in space launch services may render the launch agreement's as an impractical, ineffective and counteractive trade instrument of the United States.<sup>233</sup>

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the perspective of a satellite manufacturer and operator, that the LEO market is too uncertain to allow effective pricing and quota provisions like those in the GEO market). GEO pricing and quota provisions are far more specific, *see* discussion, *supra* Part III.C.3 (describing provisions for GEO launches), than LEO pricing and launch restrictions. *See* discussion, *supra* Part III.C.4 (describing provisions for LEO launches).

230. *See 1996 SLA Hearing, supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (arguing that in addition to the adverse effects on the satellite industry, the United States cannot maintain quotas against China and the Russian Federation when the industry is facing new competitors in Japan, Brazil, and India).

231. *See 1996 SLA Hearing, supra* note 88, at 48 (testimony of Donald W. Eiss, United States Trade Representative for Industry, and Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern Central Europe and Eurasia) (stating that the space launch agreements are intended to provide a free and fair trading environment).

232. *See 1996 SLA Hearing, supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (stating that the United States should focus its efforts on controlling Arianespace's unfair trade practices). Lockheed-Martin is a longtime bitter rival of Arianespace. *See generally* Tim Furniss, *Bigot's Battle*, FLIGHT INT'L, Aug. 2, 1995, available in 1995 WL 12266775 (responding to Lockheed-Martin's challenge to take away Arianespace's market share, Charles Bigot of Arianespace comments, "[c]ompetition is competition, that's fine, but the aggressive tone of ILS is uncalled for. We don't want a war, but, when a giant like Lockheed Martin is capable of such a tone, it augers for quite a battle in the future"); *Restrictions Sought by Lockheed Aren't Needed or Appropriate, Bigot Says*, SATELLITE WK., Oct. 3, 1994, available in 1994 WL 8734091 (responding to Lockheed's complaints against Arianespace's highly subsidized launch service, Bigot defends Arianespace's subsidies, arguing that Lockheed benefits from similar subsidies in the United States).

233. *See, e.g., supra* note 137 (citing congressional criticism of the launch agreements).

## 2. Difficulties in Applying the Pricing Guidelines

Ideally, the cost guidelines manifest a means for facilitating a transition to market principles<sup>234</sup> and effectively monitoring compliance.<sup>235</sup> Nevertheless, it is extremely difficult to make one-to-one comparisons, or derive a "fair trade" standard for trade in launch services.<sup>236</sup> Ultimately, the pricing guidelines may be unenforceable, even irrelevant in the larger marketplace.

United States Trade Representatives attest to the great difficulties in obtaining the costs incurred with a launch services offering price.<sup>237</sup> The required information is simply not being provided. Moreover, United States companies are usually hesitant to provide any detailed information on contract costs.<sup>238</sup> But this refusal to provide business costs, to provide the highly sensitive information that may affect a competitive position in the marketplace is expected.<sup>239</sup> However, without a comprehensive comparison of costs, the Sub-

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234. See 1993 Russia Trade Agreement, *supra* note 7, art. I ; 1995 China Agreement, *supra* note 9, art. I ; 1996 Ukraine Trade Agreement, *supra* note 8, art. I.

235. See discussion, *supra* Part III.C.3 (discussing the monitoring and enforcement strategies of the monitoring Subcommittee).

236. See 1996 SLA Hearing, *supra* note 88, at 50 (statement of Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern Central Europe and Eurasia) (arguing that comparing launch bids is very complicated because there are other considerations besides the offering price); *supra* notes 177-180 and accompanying text (discussing the need to resort to non-price factors when a contract bid falls below a fifteen percent threshold).

237. See 1996 SLA Hearing, *supra* note 88, at 50 (statement of Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern / Central Europe and Eurasia) (noting that China has been reluctant to provide cost information); discussion, *supra* Part III.B.3 and accompanying text (discussing requirements for data exchanges).

238. See 1996 SLA Hearing, *supra* note 88, at 50 (statement of Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern Central Europe and Eurasia) (noting that the cost comparisons are further complicated by the fact that United States launch providers often provide their cost information in only summary form).

239. The information disclosures required by the launch agreements often involve exchanges of confidential business practices. Although the purpose of an information disclosure is to ensure a fair trading environment, a business would be reluctant to risk an information "leak" to a competitor during intergovernmental negotiations.

committee cannot clearly ascertain whether or not the contract price is justified.

Even if all business information were fully disclosed, the Subcommittee would still be challenged with making one-to-one comparisons of non-market and Western launcher costs. First, Western labor and material costs differ from those in the non-market nations.<sup>240</sup> If labor and material costs were the sole criterion, non-market contractors would drastically underbid Western providers.<sup>241</sup> Second, there is no ready way to compare "Western-type" government subsidies with non-market country subsidies.<sup>242</sup> On the one hand, Western launch providers will claim that China's centralized economy internalizes costs that Western launch providers must recover in contract prices.<sup>243</sup> On the other hand, the Chinese and Rus-

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240. See *SN Newsmaker Interview: A Talk with ASIASEAT's Terry Seldon*, SATELLITE NEWS, Dec. 7, 1992, available in 1992 WL 2611622 [hereinafter *ASIASEAT's Terry Seldon*] (discussing relatively low Chinese labor costs); *Great Wall's Government Backing Depends on Aggressive Marketing*, AEROSPACE DAILY, Sept. 3, 1992, available in 1992 WL 2305740 [hereinafter *GWIC Strategy*] (describing China's centralized economy, government support of GWIC, and low labor costs); 1996 SLA Hearing, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (stating how the Chinese and Russian economies differ from the West).

241. See *ASIASEAT's Terry Seldon*, *supra* note 240 (arguing that requiring an "on par" cost with Western launch services is useless because the Chinese do not price labor and material in the same manner as the West).

242. Compare 1996 SLA Hearing, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (stating how the non-market nations are unconstrained by real costs due to substantial government support and a centralized economy), with *id.* at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (stating how Arianespace, a Western launch service provider, is the most subsidized launch service provider in the world), and *X33 Testimony*, *supra* note 104, at 59 (statement of Ray A. Williamson, Senior Research Scientist, Space Policy Institute) (arguing that the United States launch industry requires government financing for the next generation launch vehicle), and Furniss, *supra* note 232, at 1 (quoting Arianespace's Bigot) (indicating that the United States' huge investment in the next generation launch vehicle will result in increased government support for Arianespace) and Anthony L. Velocci, *Atlas 2AR Forms Core of Launcher Strategy*, AVIATION WK. & SPACE TECH., Nov. 6, 1995, available in 1995 WL 10193122 (describing how Lockheed-Martin's investment in Russian engine technology will most likely lead to increased government subsidies for Arianespace).

243. See *id.* (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations

sian governments cannot offer their launch providers the vast number of government satellite launch contracts which the United States reserves for its launch providers.<sup>244</sup>

Notwithstanding the goals of ensuring that a contract price actually reflects the real costs or is "on par" with Western trade practices, the reviewing agency must consider factors which place non-market launch providers at a fundamental disadvantage in the Western marketplace.<sup>245</sup> Satellites launched on Western launch vehicles are not encumbered by stringent technology control plans<sup>246</sup> and export licensing processes.<sup>247</sup> China, Russia, and Ukraine, therefore, need to charge substantially less for their launches because few, if any, customers would pay Western prices for the higher costs associated with launch integration, launch support and restricted East-West technology exchanges.<sup>248</sup> Although Russian booster technology is considered as advanced as in the West,<sup>249</sup> political risks,<sup>250</sup> cash-flow

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McDonnell Douglas Corp).

244. See 42 U.S.C. § 2465 (d) (1994) (stating that NASA satellite launches are restricted to United States launch services); Smith, *supra* note 20 (stating that the United States' policy towards launches of government satellites has been a frequent source of criticism by launch competitors).

245. See *GWIC Strategy*, *supra* note 240, at 3 (stating that GWIC needs to offer low prices in order to attract customers); *supra* note 177 (describing the various non-cost factors justifying a lower contract bid, including barriers to technology exchanges, export restrictions, and the increased launch and integration costs associated with launch facilities in China and Russia).

246. See *SLA Hearing*, *supra* note 88, at 48 (statement of Donald W. Eiss, United States Trade Representative for Industry) (noting that the differences in cost associated with export restrictions and transportation also need to be included in contract price comparison); *supra* note 206 (describing the burdensome requirements imposed by technology control plans).

247. See discussion, *supra* Part III.C.5 (discussing requirements for technology control plans before export licenses are issued; the process of evaluating export licenses on a "case-by-case" basis; and the State Department's control over export licenses).

248. See *supra* note 177 and accompanying text (stating that the non-price factors can negate cost advantages in choosing a Chinese or Russian launch vehicle).

249. See discussion, *supra* Part I.D (discussing Western concern over the potential for Russia's rocket fleet in the early 1990s).

250. See *Special Report—Profits, Pitfalls of U.S.-Russian Space Ventures*, SATELLITE NEWS, July 17, 1995, available in 1995 WL 5914622 (listing the numerous barriers inhibiting Russian competitiveness). The study found that the potential barriers to Russia's entry into Western market includes technical risks associated with integrating Western-Russian space technologies, Russian military

problems,<sup>251</sup> and launch facility problems<sup>252</sup> make the Russian launch provider less attractive to customers. In short, there are a variety of factors justifying an aggressive contract price. What would be seen, at first blush, as predatory prices<sup>253</sup> may, in reality, be the only means for competing in the marketplace.

These non-cost factors have allowed Chinese and Russian launch service providers to charge less for satellite launches.<sup>254</sup> The major influence of these non-cost factors is evidenced by the fact that no such contract has ever met the fifteen percent pricing threshold.<sup>255</sup> If a pricing guideline is ever followed, will it serve the purpose of reaching an open-trading environment in space launch vehicles? The question is, therefore, not whether non-cost factors justify non-market country underbidding, but whether the terms of the agreements<sup>256</sup> serve the goals of encouraging Western trade practices.

The myriad of factors that influence access to the Western launch market, and lack of candor in the negotiation process, suggest that the compliance provisions in the launch agreement provisions offer

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actions undermining economic and political stability, crime, corruption and cultural barriers. *See id.* at 1-2.

251. *See id.*

252. *See U.S. Firm Says Baikonur Improving Slowly*, AVIATION WK. & SPACE TECH., July 31, 1995, available in 1995 WL 2237817 (describing the deteriorated conditions at the Russia's Baikonur launch facility).

253. *See 1996 SLA Hearing*, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (arguing that non-market nations are ignoring the pricing guidelines and engaging in predatory pricing strategies at the expense of Western launch service competitors who have to recover costs in contract prices).

254. *See 1996 SLA Hearing*, *supra* note 88, at 48 (testimony of Donald W. Eiss, United States Trade Rep. for Industry and Labor, and Catherine Novelli, Deputy Assistant United States Trade Representative for Eastern / Central Europe and Eurasia) (justifying United States approval of lower contract prices due to non-cost factors).

255. *See SLA Hearing*, *supra* note 85, at 1-3 (opening statement of Rep. Weldon) (asserting that no non-market country launch provider has thus far shown a willingness to abide by the cost provisions). The 15% threshold raises a presumption of whether the bidder is participating in predatory pricing strategies. *See* discussion, *supra* Part III.C.3 and accompanying notes (describing the Subcommittee monitoring functions).

256. 1996 Ukraine Trade Agreement, *supra* note 8, art. I; 1993 Russia Trade Agreement, *supra* note 7, art. I; 1995 China Agreement, *supra* note 9, art. I.

little guidance to the Subcommittee.<sup>257</sup> Without a more comprehensive set of trade rules, the monitoring authority will be forced to deal with uncertainties in an ad-hoc manner.<sup>258</sup> Trade restrictions will continue to depend on “closed-door” government assessments of compliance, involving certain “guess-work” on whether a given contract bid is fair or reasonable. Under the current environment, a more open exchange seems unlikely. Perhaps an information exchange through a neutral third party<sup>259</sup> would better address the need for preventing disruption during this transitional period<sup>260</sup> in the space launch services market.

### 3. *Quantitative Limits (Quotas)*

Quantitative limits are by far the most contentious issue surrounding the launch agreements.<sup>261</sup> By restricting the number of non-Western launches, the United States is directly protecting Western launch vehicle market share.<sup>262</sup> On the other hand, the quotas serve to

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257. See discussion, *supra* Part III.B.1-3 (describing a treaty procedure whereby the Subcommittee reviews questionable launch bids by resorting to negotiations, suggesting that there is a certain lack of rules to be followed).

258. See discussion, *supra* Part III.B.1-3 (suggesting that the resolution of questionable market bids are ultimately reviewed on a case-by-case basis by resorting to non-price factors arising from the launch vehicle mission requirements and the services provided to the launch customer).

259. See *1994 Global Trade Hearing*, *supra* note 32, at 121 (testimony of R. Grabe, Vice President Orbital Sciences Corp.) (arguing that compliance with the data exchange requirements in the agreements could be better accomplished if an international clearinghouse entity, consisting of participating governments and industries, was established to independently review the relevant data).

260. See generally *The Commercial Space Launch Act Amendments of 1988*, Pub. L. No. 100-657, § 9, 102 Stat. 3900 (endorsing negotiated trade in space launch services as a means for transitioning to a set of multilateral trading rules).

261. See generally *1996 SLA Hearing*, *supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (focusing criticism on the agreements, Dailey stated that the United States trade policy is “synonymous with one word: quota”); *1994 Global Trade Hearing*, *supra* note 32, at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (focusing criticism on the launch quotas).

262. See *1996 SLA Hearing*, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (explaining how McDonnell Douglas requires restrictions on non-market nation launchers in order to recover costs associated with development of the Delta III heavy launch vehicle).



hinder United States satellite competitiveness.<sup>263</sup>

The current launch agreements contain provisions for increasing launch quotas, depending on three and four year projections of launch demand.<sup>264</sup> While it might seem relatively straightforward to allot the requisite number of launch vehicles based on Western launch vehicle availability, the realities of the commercial space launch market suggest that the quota-system is deficient in many respects. First, the practice of buying up multiple launch options in order to spread out launch failure risks<sup>265</sup> does not fit neatly into the quota allotment strategy. Second, satellite contracts will often hinge on which launch vehicle can be contracted.<sup>266</sup> Third, quotas restrict the ability of satellite customers to search-out the best price for launch services.<sup>267</sup>

Quotas are based on Subcommittee assessments of five-year market demand projections which estimate the number of launches and then compares these launches to the availability of Western launch vehicles.<sup>268</sup> The problem is that satellite manufacturers book more

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263. See 1994 *Global Trade Hearing*, *supra* note 32, at 72 (statement of Bary Bertiger, Corporate Vice Pres. and Assistant General Manager, Satellite Communications Division of Motorola) (stating how the quotas force satellite customers to pay the higher costs for Western launch vehicles); 1994 *Global Trade Hearing*, *supra* note 32, at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (arguing that the agreements force the satellite industry to subsidize United States launch providers).

264. 1996 Ukraine Trade Agreement, *supra* note 8, art. V (1); 1993 Russia Trade Agreement, *supra* note 7, art. IV (1)-(2) ; 1995 China Agreement, *supra* note 9, arts. IV (2)-(4).

265. See discussion, *supra* Part II.C (discussing market strategies for dealing with launch vehicle reliability).

266. See discussion, *supra* Part II.B (describing the interests shared by the purchaser of a satellite and the launch service provider, the interests being linked by a joint ownership in the satellite communications venture).

267. See 1994 *Global Trade Hearing*, *supra* note 32, at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (stating that by limiting the use of non-market nations launch vehicles, the launch agreements are preventing satellite companies from seeking out the lowest cost-to-orbit); *id.* at 72 (statement of Bary Bertiger, Corporate Vice Pres. and Assistant General Manager, Satellite Communications Division of Motorola) (asserting that by restricting access to foreign launch vehicles, the United States government is controlling satellite costs).

268. See *supra* note 162 (discussing the use of market forecasts to evaluate supply and demand).

than one launch vehicle to cover launch failures and delays.<sup>269</sup> The Subcommittee recognizes the need to spread risks.<sup>270</sup> However, placing the availability of launch vehicles in the hands of the government does little to satisfy business needs in a competitive environment. Industry wants to make its own risk assessment; they do not want to leave the decision making up to government market analysts.

Satellite manufacturers have to respond to customer preferences in launch vehicles. Imposing quotas on the Russian Proton could jeopardize the United States bids on an INMARSAT<sup>271</sup> satellite contract because Russia shares in this satellite consortium.<sup>272</sup> Similarly, IRIDIUM<sup>273</sup> satellite launches will sometimes prefer Chinese launches because of China's market share in IRIDIUM.<sup>274</sup> If China and Russia reach their launch limits, United States satellite companies could lose out on these contracts.

Satellite contracts usually include costs for launch vehicles.<sup>275</sup> By limiting the choices of launch vehicles, satellite manufacturers are forced to pay Western prices. Thus, while satellite manufacturers have control over their costs for production and maintenance, the costs for launch vehicles are, arguably, controlled by the United

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269. See discussion, *supra* Part II.C (discussing market strategies for dealing with launch vehicle reliability).

270. See 1995 China Guidelines, *supra* note 157, at 20,798 (stating that the needs to minimize risk are considered in launch quotas).

271. See *supra* note 77 (describing the INMARSAT satellite consortium).

272. See *supra* note 99 and accompanying text (implying that Russia's part ownership in INMARSAT forces satellite companies competing for INMARSAT satellite contracts to use Russian launch vehicles).

273. See 1994 *Global Trade Hearing*, *supra* note 32, at 72 (statement of Bary Bertiger, Corporate Vice Pres. and Assistant General Manager, Satellite Communications Division of Motorola) (describing Motorola's mobile communication system known as IRIDIUM).

274. See *supra* note 99 and accompanying text (implying that China's investment in IRIDIUM will keep GWIC launch services in the satellite launch market); 1994 *Global Trade Hearing*, *supra* note 32, at 72 (statement of Bary Bertiger, Corporate Vice Pres. and Assistant General Manager, Satellite Communications Division of Motorola) (arguing that quotas are not wise for LEO satellite launches as the IRIDIUM system is multinational in nature and requires cooperation in launch vehicle services with countries like China).

275. See discussion, *supra* Part II.A-B (discussing market practices whereby customers buy both the satellite and launch vehicle).

States government.<sup>276</sup> But one must remember that United States interest in restricting non-market nations access to the Western launch services market serves two purposes: (1) preventing disruption to the Western trading environment where the rules of the market prices are difficult to apply via treaty,<sup>277</sup> and (2) protecting the Western market during this transitional period<sup>278</sup> where the United States launch services industry cannot survive through private investment alone<sup>279</sup> and the government maintains strong interests in access to space.<sup>280</sup> It can be argued that the launch agreement quota system is a government subsidy alternative to direct investment.<sup>281</sup> Although United States government investment in launch vehicle technologies continues,<sup>282</sup> launch vehicle advocates still believe that more government support is needed.<sup>283</sup>

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276. See *supra* note 267 (providing arguments that the United States government controls the cost of launch vehicles).

277. See 1994 *Global Trade Hearing*, *supra* note 32 (statement of Eiss, Deputy Ass't USTR for Industry) (noting that the use of quotas in conjunction with pricing guidelines is the only reliable framework in which "business plans can be developed and executed").

278. See 1996 *SLA Hearing*, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (arguing that the private investments by McDonnell Douglas in the Delta III launch vehicle can be recovered so long as the United States maintains quotas against the non-market economy launch vehicle suppliers).

279. See generally 1996 *SLA Hearing*, *supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (arguing that the space launch services industry's traditional reliance on government support must be continued).

280. See discussion, *supra* Part I.A (outlining governmental interests in space launch vehicles).

281. See *supra* note 263 (implying that a market subsidy is employed by using quotas). But see *supra* discussion Part III.D.2 and note 277 (implying that quotas are needed in a market where it is very difficult to establish pricing rules).

282. See *X33 Testimony*, *supra* note 104, at 59 (statement of Ray A. Williamson, Senior Research Scientist, Space Policy Institute). See generally 1996 *SLA Hearing*, *supra* note 88 (statements of Dan Goldin, NASA Administrator and Robert Davis, Undersecretary for Space for the Department of Defense) (detailing the current government investment programs in new launch vehicle technologies and launch facilities).

283. See generally 1996 *SLA Hearing*, *supra* note 88, at 96 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (arguing that the increase in the launch agreement quotas in recent years jeopardizes the McDonnell Douglas investment in the Delta III program); *id.*, at 28 (testimony of Mr. Robert Davis, Deputy Undersecretary for Space, Dept. of Defense) (taking

#### 4. The Low Earth Orbit (LEO) Satellite Market

Criticisms of pricing and quota provisions have reached a high point since the early 1990s when the first proposals were made for launching LEO communication satellite constellations.<sup>284</sup> The relatively matured GEO are more predictable in terms of launch manifests, costs, and availability;<sup>285</sup> however, the uncertain requirements of future LEO constellations may make an effective implementation of the flexible quota strategy impossible.<sup>286</sup>

There are two difficulties with the current LEO quota guidelines. First, the quotas suggest that the use of non-market nations launch providers might increase with LEO satellite launches.<sup>287</sup> Second, the LEO guidelines potentially threaten the viability of those satellite constellations which depend heavily on world-wide participation.<sup>288</sup> These criticisms highlight the re-occurring conflicts of interest between the launch services industry and the satellite industry.<sup>289</sup> On the one hand, is the United States space launch vehicle industry still

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exception with the rising quotas for non-market country providers who are under-bidding Western providers).

284. See Jeffrey M. Lenorovitz, *5 Year Outlook: Space Steady Growth Seen for Commercial Space*, AVIATION WK. & SPACE TECH., March 15, 1993, available in 1993 WL 2622882 (discussing proposals for large-scale LEO satellite constellations).

285. See *1994 Global Trade Hearing*, *supra* note 32, at 121 (testimony of Donald Phillips, Ass't United States Trade Representative for Industry).

286. See *supra* note 195 and accompanying text (suggesting that the LEO provisions could be eliminated if industry decides to pursue large scale LEO satellite constellations).

287. See *1994 Global Trade Hearing*, *supra* note 32, at 121 (testimony of R. Grabe, Vice President Orbital Sciences Corp.) (stating that traditionally, United States launch providers captured 80% or more market share; however, this number could fall to a level well below 50% in the late 1990s if the Russians are unconstrained).

288. See *1994 Global Trade Hearing*, *supra* note 32, at 57 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH).

289. See discussion, *supra* Part III.D.1 (summarizing the conflicts of interests between launch service providers and the satellite industry). Spokespersons for United States commercial spaceports have voiced criticized the launch agreements as well. *1996 SLA Hearing*, *supra* note 88 (statement of Donald D. Smith, Executive Director of the Western Commercial Launch Space Center) (arguing that the LEO provisions should not allow non-market nations to gain up to 50% market share in a business where United States launch facilities compete for launch services).

in need of the government protections, or subsidies, provided by quotas where comprehensive trading rules for investors have yet to evolve? On the other hand, how can the United States best formulate a strategy which does not hinder the growth and development of the commercial satellite market in which its own satellite industry is a major player?

#### IV. RECOMMENDATIONS / CONCLUSIONS

International policies depend on trust and good-faith efforts when reaching trade agreements. The United States must always take a vigilant stand against trading environments which threaten strategic industries like the space launch vehicle industry.<sup>290</sup> The launch agreements serve these goals, however, change is needed when once-needed government policies begin to run counter to changing economic environments by removing incentives to invest in new technologies and threatening United States market share. The time is ripe for replacing negotiated trade protectionism in the commercial space launch market with a belief that the United States launch services industry can sustain a major market share and compete in a more open trading environment.

##### A. AN END TO LAUNCH QUOTAS

The United States can relax the overt discriminatory effects of launch quotas on non-market nations without risk of destabilizing the United States commercial launch services industry. The past eight years demonstrate China's limited potential for disrupting the Western market,<sup>291</sup> integration of Russian and Ukrainian launch vehicles with Western suppliers,<sup>292</sup> and an increasing dependence on Western

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290. See generally *Military Space Power*, *supra* note 29 (collecting testimony regarding how the commercial space sector, and in particular the launch services industry, pose challenges that implicate national security, foreign policy, military, and economic policy interests).

291. See generally discussion, *supra* Part I.B (describing China's unimpressive entry into the launch services market).

292. See *supra* notes 87-89 (describing joint ventures between the West and Ukrainian and Russian launch providers).

support by China,<sup>293</sup> Russia,<sup>294</sup> and the Ukraine.<sup>295</sup> These trends suggest that none of these launch suppliers will fare well in the Western marketplace unless there is more cooperation with the West. In short, arguments supporting the necessity of using quotas as a means for preventing disruption to Western markets are becoming less tenable.

China's launch program has yet to show the potential to capture a larger percentage of the launch services market. China's launch services industry cannot, in the near term,<sup>296</sup> offer the reliability and capacity of Western providers.<sup>297</sup> Without a technological or economic capability to compete with Western providers, policymakers should reconsider whether quotas on Chinese launch vehicles are unnecessarily blocking commercial opportunities for United States business. In 1989, no one knew China's potential in the launch serv-

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293. See *supra* note 61 (discussing China's desire to seek out greater cooperation with the West in light of its failing launch services program).

294. See Janet Guyon & Betsy McKay, *Aerospace: Russia's Rocket Makers Seek Cash Boot*, ASIAN WALL ST. J., Sept. 11, 1996, available in 1996 WL-WSJA 12473310 (discussing how Russia relies on financial support from the west in order to maintain its space program).

295. See Joseph C. Anselmo, *Russia Pushes for Bigger Launch Market Share*, AVIATION WK. & SPACE TECH., Jan. 22, 1996, available in 1996 WL 7631050 (stating how the problems at the Baikonur launch facility and cash flow problems in Russia effect equally Ukraine's launch services potential because the two countries are economically linked).

296. The author does not wish to speculate on China's potential in space launch services in ten years. The issues surrounding this topic are well beyond the scope of this piece. This author merely asserts that China cannot compete with Western providers in today's marketplace.

297. China has not captured a larger market share for three reasons: (1) inferior launch vehicle technology compared to the West, see Furniss, *supra* note 208 (discussing the number of Long March launch failures and noting that even in the best of times, China could not compete with the Western providers because it lacks the launch vehicle capacity); (2) a reluctance to disclose information following launch failures, see *Special Report*, *supra* note 99 (discussing China's refusal to disclose information regarding a launch failure, causing customers and insurers to turn away from Chinese launch services); *Hughes Discusses 3rd Chinese Satellite Launch as Optus B-2 Probe Continues*, SATELLITE WK., Feb. 15, 1993, available in 1993 WL 2613800 (discussing possible reasons for the first Optus-2 launch failure, adding that China is unwilling to disclose details of possible launch vehicle problems); and (3) loss of life, see *supra* notes 58-59 and accompanying text (noting that loss of life resulting from Chinese launch failures have caused satellite customers to seek launch services elsewhere).

ices market.<sup>298</sup> The parties imposed quotas as a protective measure for Western launch competitors.<sup>299</sup> Now, the world market views China's poor launch record and protective strategies as unacceptable,<sup>300</sup> demonstrated by an exodus of customers and a diminishing number of insurance providers.<sup>301</sup> These developments force a conclusion that China cannot, in the near term, achieve a more significant market share through predatory pricing.

Prior to the 1993 Russia Agreement, the West voiced strong concerns over the potential effect of Russia's entry in the launch services market.<sup>302</sup> Now, the failing Russian and Ukrainian space infrastructures<sup>303</sup> suggests that these once ominous launch vehicle providers<sup>304</sup> cannot dictate their own rules for the market.<sup>305</sup> As a result, Russia and Ukraine have become increasingly dependent on Western support.<sup>306</sup> Fears of dumping low-cost launch vehicles on the world-market<sup>307</sup> are simply not as prevalent as they once were.<sup>308</sup> Although

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298. See 1988 Space Roundtable, *supra* note 39.

299. See 1989 China Agreement, *supra* note 37, art. IV.

300. See *supra* note 297 (summarizing the reasons why China has not gained significant market share).

301. See *supra* discussion Part I.B (discussing China's dwindling market in recent years).

302. See discussion, *supra* Part I.D and accompanying text (discussing Russia's advanced technology and large arsenal of launch vehicles with proven capabilities).

303. See *supra* note 250 (discussing Russia's problems with crime, corruption and cash flow).

304. See discussion, *supra* Part I.D (stating that Russia possessed advanced booster technology).

305. See *supra* note 250 and accompanying text (stating that the financial crisis and political risks in Russia have limited their competitiveness in the launch services market).

306. See *supra* notes 294 and 295.

307. See 1996 SLA Hearing, *supra* note 88, at 98-99 (testimony of Stanely Ebner, Senior Vice Pres., Wash. Operations McDonnell Douglas Corp.) (criticizing the administration's failure to enforce the pricing provisions and requesting enforcement of the quota provisions due to the potential of non-market providers to flood the market with low-cost launch vehicles); 1994 Global Trade Hearing, *supra* note 32, at 121 (testimony of R. Grabe, Vice President Orbital Sciences Corp.) (asking that the LEO restrictions be modified to further limit non-market country participation).

308. See discussion, *supra* Part I.D (discussing Western reaction to the former Soviet launch providers entry into the launch services market in the early 1990s).

a relaxation of Russian launch quotas would threaten some Western launch providers,<sup>309</sup> a more open market for ex-soviet launch vehicles will afford United States satellite providers the same opportunities as foreign competitors.<sup>310</sup> Moreover, a relaxation of quotas would arguably promote more favorable market transitioning mechanisms such as the formation of joint ventures<sup>311</sup> in launch services.

The launch agreements depend on market forecasts to implement the quota strategy.<sup>312</sup> The strategy is at best marginally acceptable to today's GEO launch vehicle customers, but the LEO strategy<sup>313</sup> has little, if any, support in the industry.<sup>314</sup> More importantly, the Russia, Ukraine, and China quotas will have little effect when countries like Japan, Brazil, and India<sup>315</sup> begin to gain market share. Rather than supporting launch quotas, the United States should place more faith in the resilience and competitiveness of the United States launch industry.

Launch quotas can only hurt the satellite industry. The international telecommunications market requires diversity in launch vehicles.<sup>316</sup> The United States satellite industry cannot continue to subsi-

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309. When one views quotas as a government subsidy, it follows that the elimination of quotas will affect some Western launch providers even if a level playing field were to exist.

310. See discussion, *supra* Part II.B (describing how access to launch vehicles affects market share in the satellite industry); discussion, *supra* Part III.D.3 (discussing how quotas serve to limit opportunities for United States satellite industries).

311. See *supra* notes 87-89 (listing the joint ventures formed between Russian, Ukrainian, European and United States Aerospace companies).

312. See *supra* note 162 (discussing the Subcommittee's use of market forecasts to assure that there is an adequate supply of launch vehicles).

313. See discussion, *supra* Part III.C.4 (discussing the Subcommittee's means for evaluating participation in the LEO market where uncertainties in demand do not allow for fixed quotas).

314. See discussion, *supra* Part III.D.1 (discussing both launch vehicle and satellite industry criticisms of the launch agreement's distinctions drawn between LEO and GEO launches); discussion, *supra* Part III.D.3-4 (discussing the arguments lodged against the trade agreement restrictions in the LEO market).

315. See generally 1996 SLA Hearing, *supra* note 88, at 90 (statement of Brian D. Dailey, Vice President, Lockheed Martin Corp.) (stating that the current quota system applies only to Russia, Ukraine and China).

316. See generally discussion, *supra* Part II.A-C (describing the needs of the satellite industry in a world market); discussion, *supra* Part III.D (discussing how



dize Western launchers by limiting launches on non-Western launch vehicles<sup>317</sup> if it is to remain competitive. Satellite planners need to be able to choose the least expensive launcher and make their own assessments of launch vehicle needs.<sup>318</sup> The United States communications satellite industry is ten-times larger than the United States launch services industry.<sup>319</sup> The United States should act now by realigning its trade policies to better reflect the larger needs of the commercial space industry.

## B. MARKET REFORM AND THE FUTURE OF THE COMMERCIAL SPACE INDUSTRY

Protectionism breeds complacency in an industry where technological innovation has stagnated<sup>320</sup> and increased demand increases costs.<sup>321</sup> When governments restrict access to the foreign satellite launch market, the domestic launch industry has less incentive to cut costs and advance technology.<sup>322</sup> Though relaxing protective mechanisms may impose hardships on the lesser established United States launch providers, a government's commitment to invest in launch vehicle technologies<sup>323</sup> offers a more harmonizing and economically more beneficial alternative for the future. If the optimistic goals in space commercialization are reachable in the next century,<sup>324</sup> greater

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quotas restrict the satellite industry).

317. See generally discussion, *supra* Part III.D.3 (explaining how quotas force the satellite industry to use Western launch vehicles when less expensive alternatives are available).

318. See 1994 *Global Trade Hearing*, *supra* note 32, at 58 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH).

319. See *id.*, at 57.

320. See generally 1994 *Global Trade Hearing*, *supra* note 32, at 53 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (noting that the United States launch fleet is over thirty years old).

321. See *supra* note 111 and accompanying text (implying that poor launch vehicle reliability has raised the costs of insuring satellites).

322. See 1994 *Global Trade Hearing*, *supra* note 32, at 58 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (arguing that placing an artificial floor on Western launch provider market share gives the industry little incentive to invest in new technologies and cut costs).

323. See discussion, *supra* note 282 (discussing current investments in launch vehicle technology).

324. See Robert S. Walker, *To Expand Frontier in Space, Embrace Open Market on Earth*, INSIGHT ON NEWS, Oct. 2, 1995, available in 1995 WL 12332387

incentives for improving United States launch vehicle capabilities and nurturing market-orientated competitiveness must start now.

A successful transition to a market-orientated trade environment will depend on whether nations can reach a consensus on trading rules despite a continuing need for government financial support.<sup>325</sup> Efforts at achieving a multilateral trading regime in an industry which relies heavily on government support structures has not been successful in the past.<sup>326</sup> Any renewed effort will be slow to implement due to the very nature of government interests in space launch vehicles<sup>327</sup> and the cost requirements of launching satellites into space. The difficulties in enforcing the launch agreement price provisions demonstrates these conflicting national interests.<sup>328</sup> In the likely event that a multilateral trade regime is slow to develop, the United States should pursue alternative means for enforcing pricing guidelines. Monitoring should not depend on "equitable" decisions reached by closed-door, inter-governmental consultations.<sup>329</sup> More transparent review processes are suggested as a means for restoring

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(stating that by 2015, space products and services will become an irreplaceable part of everyday life).

325. Government investment in space launch vehicles will continue for some time to come. *See 1994 Global Trade Hearing, supra* note 32, at 53 (testimony of Steven D. Dorfman, Pres., Telecomm. and Space Sector, GMH) (arguing that the United States government needs to support the development of launch vehicle technologies); *1996 SLA Hearing, supra* note 88, at 88 (testimony of Brian D. Dailey, Vice Pres., Bus. Develop. Space and Strategic Missiles Sector, Lockheed-Martin Corp.) (advocating government support in launch vehicle development); *1996 SLA Hearing, supra* note 88, at 48 (statement of Donald W. Eiss) (stating that government investment in launch vehicles is an integral part of United States Space Policy).

326. *See* discussion, *supra* Part I.C (discussing the failed attempt at reaching a trading consensus with the Europeans in the 1990 "Rules of The Road" talks).

327. *See* discussion, *supra* Part I.A (discussing how national security, political and economic interests of governments are linked to a space launch vehicle capability); discussion Part II.B (stating that government interests in launch vehicles preclude wholly private investors from competing in space launch services).

328. *See* discussion, *supra* Part III.D.2 (arguing that industry-wide government subsidies complicate the enforcement of pricing provisions); *supra*, note 232 and accompanying text (noting the strong criticisms exchanged between Arianespace and ILS in light of the difficulties of enforcing pricing guidelines).

329. *See* discussion, *supra* Part III.B.2-3 and accompanying notes (demonstrating how questionable contract bids are resolved by comparing non-price factors and engaging in inter-governmental consultations to determine whether the contract bid is "fair").

confidence in the negotiation process.<sup>330</sup> Notwithstanding the certain obstacles preventing a more open disclosure of costs in a competitive business environment,<sup>331</sup> the United States should consider whether placing authority in an international review committee<sup>332</sup> might alleviate some of the antagonism which arises during exchanges of information between governments with direct ties to launch service providers.

New hope exists for reaching a multilateral trading consensus in the commercial launch services industry. International cooperation in the industry is now far more prevalent than in past years.<sup>333</sup> In 1990, the "Rules of the Road" talks between the United States and the European Community<sup>334</sup> were most likely unsuccessful because Arianespace was unwilling to jeopardize its fifty percent share.<sup>335</sup> Now, the coming glut in launch vehicles<sup>336</sup> and increasing United States market share<sup>337</sup> is convincing the Europeans to begin replacing confrontation with cooperation.<sup>338</sup> If these once bitter rivals<sup>339</sup> can coop-

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330. See discussion, *supra* Part III.B.2 and accompanying text (arguing that the Subcommittee engages in guesswork and behind the scenes trade-offs to determine whether non-market nation launch service providers are engaging in predatory practices); *supra* notes 255 (stating that the Subcommittee has allowed the non-market launch providers to undercut United States launch providers).

331. See discussion, *supra* Part III.D.2 (discussing the difficulties in obtaining outlays justifying contract offering prices).

332. See *supra* note 259.

333. See *Trends in Space Launch Services*, *supra* note 89 (listing joint ventures in space launch services).

334. See discussion, *supra* Part I.C.

335. See generally Garcia, *supra* note 23, at 366 (stating that the reasons why there was a failure to reach an agreement in the "Rules of The Road" talks are unknown because the negotiations were secret); Radzanowski and Smith, *supra* note 20, at 3-4 (arguing that the European's protection of their market share and United States unwillingness to allow Europe to launch United States government satellites contributed to the failure to establish a fair agreement in the "Rules of the Road" talks).

336. See discussion, *supra* Part II.D (discussing trends in supply and demand in space launch services).

337. See 1996 *Banner Year*, *supra* note 134 (stating that the United States expects to achieve greater than 50% of the launch services market share in 1997). In previous years, Arianespace dominated the launch services business. See *id.*

338. See, e.g., *Arianespace Seeks Partners, Plans to Cut Costs by Up to 30%*, WALL ST. J. EUR., Jan. 9, 1997, available in 1997 WL-WSJE 3804328 (stating that increased competition has caused the Europeans to seek foreign partners to

erate, perhaps a multilateral trade regime will soon be possible.

Until recently, no one could predict China's response to its dwindling market share. Would China respond by increasing its predatory market strategies or increase sales of missile technology to Third World countries,<sup>340</sup> or would China seek cooperation with the West? In 1996, China announced that it wished to pursue cooperation with the West in the form of joint ventures and technology exchanges.<sup>341</sup> China's new reliance on the West suggests that a more open East-West forum may soon be possible.

Rather than place undue reliance on protective mechanisms at the expense of promoting "free and open trade,"<sup>342</sup> the United States should recognize that more beneficial means now exist for transitioning to a "trade environment characterized by the free and open interaction of market economies."<sup>343</sup> The trends in today's commercial space marketplace suggest that the participating nations may now be in a position to begin reaching a consensus on trade in space launch services.

### C. CONCLUSION

Commercial space has evolved from a political-economic based policy to a policy driven by economic interests. When China was first allowed into the market, the United States used the launch agreements as a tool for furthering political interests.<sup>344</sup> Now, such

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use their launch facilities); *Bigot Sees Joint Ventures as Alternative to Launch Shakeout*, AEROSPACE DAILY, Oct. 21, 1996, available in 1996 WL 12277488 (stating that a coming glut in launch services will require former competitors to join forces and enter into joint ventures); Pierre Sparaco, *Space Launch Industry Faces Dramatic Change*, AVIATION WK. & SPACE TECH., Dec. 16, 1996, available in 1996 WL 10850268 (noting that Arianespace's market share is expected to decrease from 50% to 21% in the next few years).

339. See *supra* note 232 and accompanying text (discussing the rivalry between Arianespace and the United States launch service providers).

340. See discussion, *supra* Part II.B and accompanying notes (explaining how countries will offset launch vehicles costs by selling missile technology to Third World countries).

341. See *supra* note 61 and accompanying text.

342. See 1994 *Space Policy*, *supra* note 48.

343. *Id.*

344. See discussion, *supra* Part I.B (arguing that the sanctions imposed on China were meant to serve political objectives).

policy decisions increasingly serve economic goals.<sup>345</sup>

In recent years, the United States has been presented with new and increasingly more complex<sup>346</sup> market developments in commercial space; market developments which have persuaded policymakers to revisit 1980s-vintage legislation endorsing regulated trade in commercial space launch vehicles.<sup>347</sup> The United States responded to changing market conditions in 1996 when the 1993 Russia Agreement was amended<sup>348</sup> and a new launch agreement was signed with the Ukraine.<sup>349</sup> Eight months later, the United States announced that negotiated trade in space launch services will end after 2001.<sup>350</sup> An end to the launch agreements may occur much sooner.<sup>351</sup>

The Commercial Space Launch Act of 1984 will continue to influence space policy decisions as this legislation is closely tied to very important governmental interests in space access and dual-use technology.<sup>352</sup> This Comment has attempted to provide an outlay of the market dynamics in today's international space industry and has concluded that the continued enforcement of market subsidies through launch quotas, although once deemed necessary, are currently more harmful than beneficial to United States space industries.

Launch quotas no longer serve United States policy goals.<sup>353</sup> The

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345. See *1994 Space Policy*, *supra* note 48 (stating policy to increase United States competitiveness in commercial space industry); see also discussion, *supra* Part III.A and accompanying notes (describing the purely market-orientated goals of the Subcommittee).

346. See discussion, *supra* Parts II.A-D (analyzing the market environment for commercial space launches); discussion, *supra* Part III.D (discussing the complexities associated with enforcing the terms of the launch agreements).

347. See Commercial Space Launch Act of 1984, Pub. L. No. 98-575, §§ 2, 3, 98 Stat. 3055 (codified as amended at 49 U.S.C. § 70101 (1994)).

348. See 1996 Russia Amendment, *supra* note 7.

349. See 1996 Ukraine Trade Agreement, *supra* note 8.

350. See *1996 Space Policy*, *supra* note 11.

351. See *U.S. Considers Unlimited Market Access for Foreign Rockets*, MOBILE COMM. REP., Jan. 27, 1997, available in 1997 WL 8577444 (reporting that there may be an opportunity to eliminate launch quotas before the expiration of the agreements; however, countries will first have to show that they have "demonstrated fair market principles").

352. See discussion, *supra* Part I.A (discussing governmental interests in supporting a robust launch vehicle industry).

353. See discussion, *supra* Part III.D (discussing the conflicts between industry needs in the marketplace and the terms of the trade agreements).

administration must place more faith in the entrepreneurial resources of the launch services industry and current investments in launch vehicle technologies.<sup>354</sup> The United States government can no longer use quotas as a means for controlling foreign participation without threatening the prosperity of the United States satellite market.

Enormous complexities surround any renewed effort at reaching a multilateral agreement in the launch vehicle marketplace.<sup>355</sup> The next stage of negotiations will have to deal with the many governmental interests in supporting<sup>356</sup> and controlling<sup>357</sup> the use of space launch vehicles. Hopefully, the recent trends in the marketplace will enable governments to reach mutually beneficial agreements and make the dreams of the next century's commercial space environment<sup>358</sup> become a reality.

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354. See *supra* note 282 (discussing current investments in launch vehicle technology).

355. See discussion, *supra* Part IV.B and accompanying notes; see also discussion, *supra* Part II.B and accompanying notes (describing the investment, costs and government related interests which factor into trade agreements); discussion, *supra* Part III.D.1 and accompanying notes (discussing the difficulties faced by the Subcommittee in enforcing pricing and quota provisions because of government financial dependence); *supra* note 232 and accompanying text (suggesting that the brutally competitive environment in launch services is due to competitors reliance on government subsidies).

356. See generally discussion, *supra* Part II.B and accompanying notes (describing the needs for substantial amounts of government support in the launch services industry); *X33 Testimony*, *supra* note 104, at 59 (statement of Ray A. Williamson, Senior Research Scientist, Space Policy Institute) (outlining the government subsidies needed for the launch industry); *1996 SLA Hearing*, *supra* note 88, at 124 (statement of David Smith, Executive Director of the Western Commercial Space Center) (outlining the government subsidies needed to support commercial space launch facilities).

357. See *supra* notes 201, 290 and accompanying text (stating the national security, military and other dual-uses for launch vehicle technology); discussion, *supra* Part II.B and accompanying notes; discussion, *supra* notes 27-31 (listing the many interests driving a government's investments in space launch vehicles).

358. See Walker, *supra* note 324.