U.S. Share of the Communications Satellite Market

In 1998, Congressional concerns over alleged leaks of space technology to China led to the passage of legislation that transferred the export-licensing jurisdiction for communications satellites from the Department of Commerce to the Department of State. The effect of this transfer on U.S. market share for commercial satellites has become an important element of the jurisdictional debate.

In this research note, part of a larger study on satellites and national security, we examine publicly available evidence for changes in the U.S. share of the commercial communications satellite market. We used public data on satellite orders from both government and private sector sources. We also looked at the number of satellites launched, which would produce a more conservative estimate of change in market share do to the lag time between order and launch. The first section looks at data on satellite orders and launches to determine if there has been a change in market share. The second section considers causality - the extent to which new U.S. restrictions caused any change. Our review suggests that there has been a significant and perhaps permanent decline and that export controls are probably one of the factors responsible for the decline.

Although there are relatively few communications satellite launches per year, several issues complicate the determination of market share. Measurement of differences (and assignment of causality for those differences) can be clouded by normal variations in satellite orders or by the lag time between when a satellite is ordered and when it is launched - most satellites launched in 2000 were ordered in 1998, before the new regulations went into effect. Some satellite orders are "captive," in that the purchaser directs them to a particular producer rather than allow an open competition.

There is also the question of which kind of communications satellite to count: all satellites (including the Low Earth Orbit constellations such as Iridium) or only the larger Geostationary Orbit (GEO) satellites that provide the bulk of communications services. We focused on GEO as the most important and most competitive sector of the market. These satellites are larger, more expensive, carry more traffic and dominate the satellite sector. LEO constellations provides a less accurate measure of market share as many programs were 'captive.' The LEO constellations have also proven to be economically untenable and this segment of the market is now unlikely to be as important as GEO.

Estimates of Market Share

Futron Corporation, a leading industry analyst group, conducted the best-known survey of the effect of the jurisdictional transfer on the satellite industry for the Satellite Industry Association (SIA). This survey found a decline in market share for U.S. satellite manufacturers. The SIA study identified "captive" satellites and did not count them, but DOD officials have said that SIA undercounted the captive market, leading it to overestimate the actual loss for the U.S. share of the satellite market.

Market Share, in Percent

Year	1995	1996	1997	1998	1999	2000	2001	2002 (est)
Europe	39%	32%	24%	27%	38%	55%	50%	20%
U.S.	61%	68%	76%	73%	62%	45%	50%	0%

Source: Satellite Industries Association

However, we found similar results using data from annual trade surveys on satellite orders received. This data suggests that although satellite orders increased by 13% in 2000, the U.S. share remained flat while the European share increased by 60%.

GEO Communications Satellite Orders, March 2000

	Current Orders	Future Orders	Increase/Decrease
US	67%	67%	0%%
Non-US	18%	29%	+61%
Total Satellite Orders			+13%

Source: Satellite Today, Satellite 2000 Survey

A 2001 survey carried out by Futron in 2001[i] on orders received by satellite manufacturers also shows that the foreign share increased significantly in 2001 and 2002.

GEO Satellite Orders-Share in Percent: 1999-2000

Company	1999	2000	2001	2002(e)
US Share	68%	43%	82%	0%
Non-US Share	32%	57%	18%	100%

Source: Futron Satellite Manufacturing Reports, April 2002

Data on GEO satellite launches provides a more conservative measure. Launch data underestimates the effect of the transfer, as it does not take into account the lag time between contract and launch. Many satellites launched in 2000 were ordered before the new rules went into effect. Satellite companies, fearful of the effects of the new regulations may have increased this 'undercount' effect.' Commerce sources report that immediately prior to the transfer, U.S. satellite companies submitted a large number of license applications for Commerce approval licensed by Commerce before jurisdiction moved to State. This licensing bulge in 1998 could also result in launch data for 2000 underestimating the loss of market share. Nonetheless, even these more conservative figures show the U.S. share of launched satellites declining by 33 percent.

GEO Satellite Launches - Share in Percent

Year	US	Non-US
2000	57%	43%
1999	72%	28%
1998	65%	35%
1997	84%	16%

Sources: Satellite News; Air Force Magazine; Federal Aviation Authority

Data from the Statistical Abstract of the United States also shows a similar trend. Revenue figures for satellite manufacturing (this includes the construction and sale of both commercial and governmental satellites) shows U.S. share declining in 1999 and remaining flat in 2000. Overall, the U.S. share of manufacturing revenue declined about 18%. While several factors influence these figures, the conclusion is that the U.S. is capturing a smaller share of the world satellite market.

Satellite Manufacturing Revenue, Billions of Dollars

Industry	1996	1997	1998	1999	2000
U.S.	7.3	10.3	11.8	10.0	10.0
Non-U.S.	12.4	15.9	18.5	15.8	18.3

Source: Bureau of the Census, Statistical Abstract of the United States, 2000

We were unable to find any data that suggested that U.S. market share increased. A review of the national and business press found numerous articles on how the change in jurisdiction has damaged U.S. industry and cost U.S. firms market share. Leading business journals, such as the Wall Street Journal, the Financial Times, Aviation Week, Space News and Investors Business Daily have all published articles on how the transfer of jurisdiction to State has damaged sales by U.S. firms. Complaints from governments and companies in Europe, Japan and Canada about newfound difficulties and obstacles in buying satellites from the U.S. also marked the first year of the transfer. This spate of negative publicity affected the perception of both U.S. investors and foreign customers about U.S. satellite manufacturers in damaging ways.

Reports from U.S. space agencies outside of the export control bureaucracy also suggest that the transfer has damaged market share. The 2000 Annual Report of the Federal Aviation Administration's Associate Administrator for Commercial Space Transportation (AST) states that although there were "slightly less" worldwide commercial launches in 2000, "the U.S. percentage of commercial launches declined more precipitously." The National Aeronautics and Space Administration's FY 1999 Aeronautics and Space Report of the President concluded: "The change in jurisdiction caused harm to U.S. satellite and component makers and incited a backlash from potential foreign buyers of U.S. satellites." The Commerce Department's 2001 Trends in Space Commerce Report concluded that after historically garnering an average of 75% of the global market for GEO satellites, only 43% of satellites projected for launch in 2002 are anticipated to be of U.S. manufacture." The report goes on to say that the reasons for this drop are "hotly debated and are explained by some by 1999 (sic) changes in U.S law."[ii]

Industry sources make the same point. The Aerospace Industries Association's annual Year-End Review and Forecast[iii] in 2000 was the first industry assessment of the effect of the transfer of jurisdiction. AIA found that exports of U.S. civil and commercial spacecraft and satellite components dropped 59 percent in 2000, according to preliminary data. A Booz-Allen study on the space industrial base sponsored by the Department of Defense and the National Reconnaissance Office also found a decline in U.S. market share, along with a decline in the financial health of the satellite industrial base.[iv]

Circumstantial evidence also supports the conclusion that U.S market share is declining. For example, Alcatel Space is expanding its satellite production capability in France to fulfill expected new contracts. Alcatel's $63 million expansion program will increase its production capacity from six to ten satellites per year. Both Alcatel and Astrium are hiring substantial numbers of new personnel "to help cater for the rush of new business" according to a European satellite survey.[v]

The picture painted by these stories and data contrasts with rosy analyses of U.S. market share before the transfer. A 1994 European survey said: "The satellite industry is an American success story. A recent assessment of world space markets found that the U.S. industry is increasing its already large share of the world space market; European manufacturers are finding it difficult to maintain even their minority share of the business. European companies such as Aerospatiale, Matra Marconi Space, Alenia and Deutsche Aerospace have been losing ground to U.S. companies such as Hughes Electronics, Lockheed Martin and Space Systems/Loral. U.S. satellite manufacturers held 71.8 percent of the committed market's value as of May 1994."[vi] This is not the story in 2001

Decline in market share is just one element of the satellite jurisdiction debate. Other elements include the effect of the change of jurisdiction on space research, on smaller component suppliers ("subcontractors"), and on the composition of the satellite services market. The climate of regulatory uncertainty created by the transfer also affects crucial related activities, such as insurance and financing of satellite construction and launch. Measuring changes in market share does not fully reflect these other issues (which will be examined separately), but there is also considerable evidence that just as the transfer of jurisdiction damaged U.S. market share, it damaged U.S. activities in these other sectors.

Causality

Foreign firms have a larger share of the satellite market since the transfer. If we had not found evidence of a decline in market share, we could have dismissed the claims that the 1998 legislation damaged U.S. satellite manufacturers' market share. However, showing that a decrease occurred at the same time as the change in jurisdiction does not establish causality. The apparent temporal correlation - the decline began after the legislative change - suggests that legislative change and decline are connected. The question is to what extent was this change responsible for market share decline.

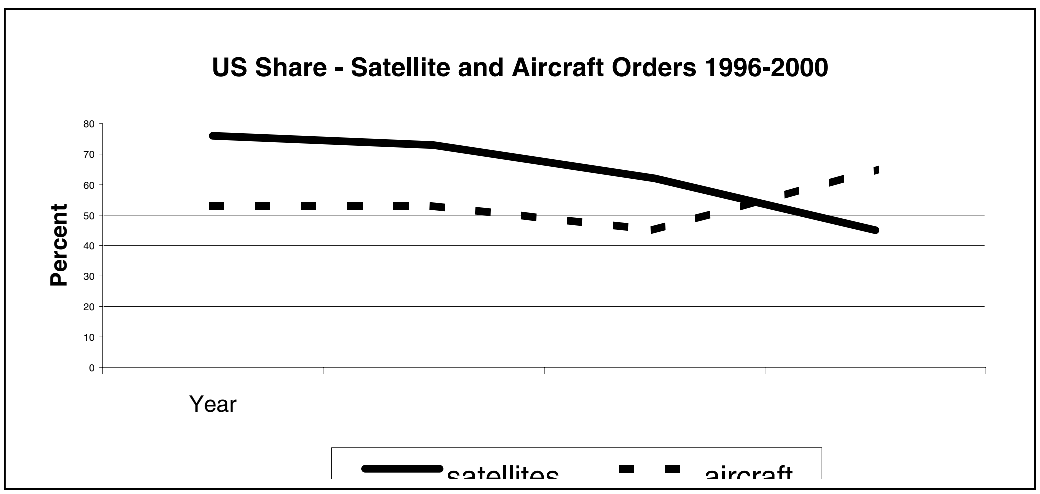
We know that State reversed, rejected or delayed a number of satellite orders to U.S. companies when it implemented the 1998 legislation, but a decline in U.S. market share could reflect several factors other than export controls. Having a 'strong' dollar compared to a 'weak' Euro (the new European currency) makes European satellites cheaper. New entrants into the commercial market, such as China, India, Israel and Russia, dilute market share (they also suggest that some technology restrictions put in place in 1998 are futile). A determined effort by European governments to become more competitive in the space market through mergers and collaboration has reduced U.S.

market share. Europe's effort to consolidated its space firms to make them a more effective competitor with the US [vii] may have received inadvertent assistance from the U.S. because of the 1998 legislation, if only because of the negative press and the public frustration expressed with the new licensing regime.

The demand for satellites from potential customers and the costs of production determine a company's share of the market. Demand for satellites is determined by general economic conditions and potential buyers' estimates of the future demand for satellite services. Since there is overcapacity in satellite manufacturing, demand is the most important factor for setting how many satellites the world market will buy from all companies in a given year.

Each manufacturer's price and delivery schedules help determine whom customers buy from and how many satellites a particular company will sell in a given year. Price differences between companies are determined by manufacturing efficiency, material costs, exchange rate differences and constraints that affect delivery times (a longer wait for delivery of a satellite mean higher finance charges and lost revenue for a customer).

Export restrictions are among these supply side constraints, but they are not the only constraint. One test for the hypothesis that export controls contributed to a decline in U.S. market share would be to look at related industries that were not affected by export controls to see if they showed similar changes. Using orders for large commercial jet aircraft, we can assess whether the decline in market share reflects factors unique to satellites or is part of larger aerospace industry trends. The U.S. share of the share of orders for large commercial jet aircraft does not track satellite market share.[viii] Both went down in 1999, but U.S. share of large aircraft orders increased in 2000.



How would legislative changes shape the market for satellites? Export controls that apply only to the U.S. affect market share because they change the price differential between U.S. and foreign satellite manufacturers. The new regulations created delays and uncertainties and increased the risk and expense of acquiring a satellite from the U.S. Purchasers must commit funds to the satellite manufacturer; they must pay interest on these funds and lose the opportunity to invest them elsewhere while the satellite is being built. On a $100 million satellite, these finance charges could be substantial. Every day the satellite is not in orbit is a day of lost revenue and greater finance charges.

Both U.S. and European companies have told us that State's extensive technology rules and DOD monitoring requirements slow down discussion between U.S. companies and foreign satellite purchasers and component suppliers. These are usually Western firms, so there is little security risk to justify the added government oversight. European companies have told us that making the design changes and modifications that are often part of the manufacturing process is slowed considerably when U.S. companies must get approval e for conversations, faxes or e-mails, making them unattractive partners. The requirement for Congressional notification can add several months' delay, primarily due to unpredictable delays in submitting notifications.

U.S. manufacturers must commit to a specific delivery date or face financial penalties. Since they know that State licensing adds delays of unpredictable length, they build in extra time into their delivery dates. This would make U.S. satellites more costly to purchase. Changes in manufacturing - the use of standardized parts and assembly line techniques - have reduced satellite production times but the ultimate uncertainty of when State will issue a license for a satellite - measured in months - increases the risks for foreign purchasers.

The extraterritorial aspects of State's regulations (discussed separately) also affect demand for U.S. satellites. State controlled items fall under sanctions that restrict sales to India and China. U.S. made-satellites, or foreign-made satellites that use State-controlled components, have additional retransfer and licensing restrictions. Foreign firms have stated that these factors make U.S. satellites less attractive.

For example, foreign operators of U.S. commercial communications satellites were surprised in 1999 when the Department of State went to them and required that they retroactively obtain "Technical Assistance Agreements" governing technology transfers for satellites that had been licensed by Commerce, exported and launched years before. These Technical Assistance Agreements are normally required only for the manufacture and launch of satellites. One Nordic embassy told CSIS that it was puzzled as to how a technology transfer could occur for a satellite already in space and to which the Nordic operator had no access. This unusual requirement probably left some foreign purchasers with a jaundiced view of ordering satellites from America.[ix]

Policy Implications

The data we found shows that the U.S. has suffered a decline in its share of the GEO satellite market and that export controls changes are partly responsible for this because of their effect on prices and demand for U.S. satellites. The 1998 restrictions on commercial communications satellites were not the only factor responsible for a decline in U.S. market share (exchange rates, new suppliers, and European industrial policy also played a role), but they came at a time when U.S. manufacturers were already under substantial pressure, and reinforced trends outside the United States that worked against the health of U.S. satellite industry.

This conclusion has several implications for policy, regardless of whether export control changes are the most important factor. First, since one of the external trends affecting market share is the entrance of new supplier nations like China and India into satellite and launch vehicle production, it is likely that the new restrictions placed new costs on U.S. industry with little or no compensating effect on foreign space capabilities.

More importantly, of the factors that account for a decline in market share, the U.S. only has effective leverage over export controls. The U.S. has little or no influence on exchange rates for the Euro, decision by other nations to enter into satellite production or European industrial policy. If the U.S. wants a healthy satellite industry, in the face of intense competition, exchange rate difficulties and with technology restrictions growing less effective, it will have to reconsider legislation widely perceived as making its satellite companies less competitive.

This question is complicated because Washington views communications satellite exports not only a commercial problem but also as a national security problem. The national security aspect that has been emphasized is the effect of the transfer on potential leakage of space and launch technology. However, an equally important aspect of satellite exports for national security has not received equal attention. This is the need to maintain a robust and technologically advanced manufacturing base to build military and intelligence satellites.

National restrictions work against the health of U.S. companies industries in global markets when foreign competitors do not face similar controls. However, national restrictions could be justified if they applied to unique U.S. satellite and launch technologies from which others could use for military advantage. If these technologies were not unique to the U.S., restrictions would damage industry without compensating security benefits.

When Congress weighed new satellite restrictions in 1998, it underestimated their cost. Congress did this because the 1998 debate overstated the "uniqueness" (and thus the risk to national security) of U.S. satellite and launch technology. Since U.S. leadership in space depends on a robust commercial satellite-manufacturing sector, we may have done more harm than good for national security by restricting exports of replaceable technologies in an effort to lower the risk of technology leakage.

The impetus the 1998 changes gave to foreign satellite manufacturers may result in a permanently larger share of the satellite market for these firms, much in the way that Airbus has permanently established itself as a leading manufacturer. In an era of fierce competition and overcapacity in satellite manufacturing, supportive government policies and a positive regulatory environment will be a key determinant for a healthy space industry. For the United States, removing regulatory obstacles may be a key determinant for keeping America strong in space.

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i http://www.futron.com/pdf/smjan01.pdf

ii Office of Space Commerce, U.S. Department of Commerce, "Trends in Space Commerce - 2000," Page 3-13

iii http://www.space.com/businesstechnology/business/aia_report_001214.html

iv Booz-Allen Presentation to CSIS Satellite Working Group, February 2001

[v] Bulloch, Chris, "Satellite Industry Shifts Focus", Interavia Business and Technology, January 1, 2001.

vi Euroconsult, World Space Market Survey (in "Space Services Market to Reach $95-$115 Billion," Aviation Week & Space Technology, August 9, 1994, p. 70).

vii See P. 18 of "Towards a Space Agency for the European Union, Annex II, Joint ESA/EC Document on a European Strategy for Space," and Logsdon, John M., "'Constructing Europe' and the Future of European Space Activities for the United States," May 2000

[viii] Aerospace Industries Association, Net New Orders, Shipments, and Backlog for Large Civil Jet Transport Aircraft, http://aia-aerospace.org/stats/aero_stats/aero_stats.cfm

ix. See the FY 99 Aeronautics and Space Report of the President for a general account of this problem.