Chapter 5

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As long as a large market for advanced air transports exists there are incentives for industry to develop them and private lenders and investors to finance them. Whether or not private parties can produce advanced air transports on their own, the Government may be interested in the management and financing of advanced air transport projects. The U.S. Government has demonstrated an ongoing concern with the structure and operations of the aerospace industry and with the development of aerospace technology.

Two important questions of potential interest to Congress regarding advanced air transport projects are: Given the existence of a market for advanced subsonic transports (ASUBTs) and, in particular, advanced supersonic transports (ASTs), could such projects be undertaken privately, and how? If the Federal Government were to take an active interest in AST and ASUBT projects, what further management and financing alternatives would exist?

The principal alternatives for implementing advanced air transport projects include: 1) conventional programs headed by a single manufacturer and supported by several subcontractor firms; 2) cooperative projects, such as a joint venture by American firms or by American and foreign firms; and 3) projects assisted by the Government, with direct or indirect financial support (and possibly technical support or guidance). This chapter will examine these alternatives, focusing on cooperative and Government-assisted alternatives because they represent departures from customary commercial air transport programs.

SINGLE MANUFACTURER

Implementation of a commercial air transport project by a single U.S. aircraft manufacturer supported by several subcontractor firms has been the norm. This approach has persisted in recent decades, with variations, despite substantial increases in aircraft production costs and instances of financial distress among aerospace firms. With sufficient resources, the single-manufacturer project can be the most efficient alternative because centralized management enables the greatest realization of economies of scale and other economies related to the division of labor among plants, firms, and geographic areas. * However, the industry may prefer an alternative approach if anticipated costs and risks are so high relative to individual manufacturers' net worth that advanced air transport projects could jeopardize the financial viability of single manufacturers—even the most financially hardy—undertaking them. Whether this would be the case cannot be determined at this time.

● Whether costs are minimized depends in part on the relationships between manufacturer and subcontractors. For example, some financial analysts believe that Boeing has ***lower*** costs than its competitors because of better relations with subcontractors. See the Standard and Poor's "Aerospace Industry Survey: Basic Analysis" prepared by Robert Spremulli, Apr. 3, 1980,

JOINT VENTURE

An obvious alternative to the traditional program headed by a single firm is a joint venture. A joint venture is a means of formally pooling resources (financial, technical, and physical) and liabilities among participating firms. It can also be a means of securing the use of patents held by

one or more participants. On the other hand, joint ventures can entail additional costs for the project. For example, if venture arrangements require that work be allocated equally (e. g., by number of hours or jobs, number of units produced, or value of product) among partners, the division of labor and the operations at any one facility may not be the most efficient. Work on a shared project may also proceed inefficiently because of differing labor conditions and work rules among partners, which may also influence how work is allocated among partners and facilities. Differing labor conditions and work rules frequently affect the activities and costs of international joint ventures, especially those that involve European aerospace firms.

Joint ventures could be established by U.S. aircraft manufacturers with other manufacturers, subcontractors, or other firms to do advanced air transport R&D or production or both. It is likely that joint ventures for advanced air transport projects would be oriented toward production for three reasons: 1) much basic advanced air transport research and development (R&D) has been (and will have been) done, 2) specific R&D is both relatively expensive and wedded to specific product concepts, and 3) production offers greater expected returns on investment than R&D. Consequently, such ventures would probably conduct only those R&D activities necessary to assure technical success of the project, although sharing the risks involved in that R&D would be a major motivation for undertaking the joint venture.

Aside from the possibility of conflicts and additional costs arising from the sharing of responsibilities, the advantages and disadvantages of joint ventures depend on whether they contain only American firms or American and foreign firms together. Major concerns regarding the composition of joint ventures pertain to national security, financing and sales, and U.S. antitrust laws. These are discussed below.

Arguments favoring U. S.-U. S. joint ventures over U. S .-foreign ones center on concerns about national security and international leadership. One argument is that international cooperative ventures should be discouraged for advanced technology projects because they may transfer technology with military applications that has been developed by Americans to foreigners. A similar argument is that international cooperative ventures may cede potential American leadership in important technologies.

The merit of these concerns depends on the state of foreign efforts in this area, and the ease with which relevant technologies can be adopted by rivals. Foreign firms have demonstrated strength in aviation technologies with both civil and military applications, strength that has been growing over the years. Consequently, the United States may have less of a technological edge in aviation projects than in the past. Nevertheless, it may be possible to reduce or eliminate opportunity for transfer of sensitive technologies by structuring a joint venture such that work in sensitive technologies originating in the United States is confined to American firms, while other work is allocated to foreign partners.

The principal appeal of joint ventures between American and foreign firms is the prospect of easier financing and larger markets than U. S.-U. S. joint ventures would expect to face. It may be easier to finance an international than a domestic joint venture because foreign participants offer greater access to foreign capital and, in particular, foreign Government funds, Several major foreign aerospace firms are owned or backed by foreign Governments (e.g., France, Great Britain, Italy, West Germany, and Japan). These governments also frequently own, support, or otherwise control local airlines, too. Consequently, a venture with foreign firms can also secure sales to foreign airlines. * Both the Concorde and the Airbus programs provide examples of foreign government support for airplane development, production, and purchases. Assurance of both foreign and domestic airline purchases would raise the expected profitability of advanced air transport projects, which could in turn facilitate external financing for American firms in the United States, if necessary.

*Aerospace joint ventures are common among European firms because they lack the large, relatively homogeneous home market U.S. manufacturers have. Joint ventures have made aircraft ventures involving only foreign firms viable by essentially guaranteeing customers in the countries of participatin[8] companies. They have also helped to spread financial losses among companies and supportive governments,

Formal access to foreign customers may be more important for an ASUBT than an AST because the special productivity and performance advantages of the AST may be sufficient to create adequate market interest. Also, regardless of production arrangements, foreign customer interest may be easier to secure for an AST than an ASUBT, inasmuch as rival programs may be much less likely.

Another advantage of international joint ventures is that such a venture may entail fewer legal or political risks to U.S. firms than a domestic one. This is because an international joint venture may be less likely to violate U.S. antitrust laws, inasmuch as foreign participants are relatively small factors in the U.S. aircraft market.

Whether or not a joint venture violates U.S. antitrust laws is a function of its design and the circumstances under which it is established. Although each potential or actual joint venture must be evaluated as a unique entity, it is possible to characterize broad considerations affecting the legality of a joint venture. Three principal considerations are: 1) whether the joint venture would limit existing or potential competition in the industry (in particular, whether independent efforts by the participants or others could and would otherwise take place); 2) whether venture arrangements impose collateral restrictions on competition; and 3) whether the venture is designed to deny competitor firms access to participation or products (especially innovations) and thereby restrain competition.

Antitrust problems are more likely (though not assured) where the market is concentrated and/or where many or all firms in a particular field seek to work together. On the other hand, if an industry leader is or will be developing the product in question, a venture among other firms may be acceptable if without it no alternatives to the product of the industry leader would be available.

Research and production joint ventures inspire different legal concerns and responses, in part because research, per se, is not market activity and also because research may help to enlarge markets through development of new products. By contrast, a joint venture to produce specific products is like a merger. The key question in either case is whether the loss of potential competition implied by a joint venture is at least balanced by the enhancement of the market provided by the products created.

The answer is found by evaluating the nature of the product, the risks involved in producing it, the likelihood of entry by participants or other firms into the relevant market, the existence of technical barriers to the formation of alternative joint ventures, and other factors. Unless the joint venture is found to have as primary or collateral purpose the fixing of prices, market shares, or market territories (which are per se violations of antitrust law), the legality of a joint venture will be judged by a "rule of reason" standard.

Note that the inability of a firm to finance a project internally is not, by itself, an acceptable justification under antitrust laws for a joint venture as long as outside financing is available (without creating a major financial burden on the firm). Also, the nationality of participants is irrelevant under antitrust laws. All foreign participants (actual or potential) in U.S. markets are subject to U.S. antitrust laws. Questions of international relations, foreign trade, national security, and international competitiveness do not enter into determinations of compliance with antitrust laws, although they may affect enforcement practice, which can vary with the policies of the Executive.

The key antitrust concerns for an advanced air transport joint venture include: 1) market definition: is the relevant market ASTs, ASUBTs, commercial air transports, or something else? 2) the ability of individual manufacturers to sponsor advanced air transport projects independently (with subcontractor support); and 3) the acceptability of particular combinations of firms and particular venture arrangements under antitrust laws.

FEDERAL GOVERNMENT INVOLVEMENT

The Federal Government may choose to sponsor or assist in the development of advanced air transports. Possible arguments that can be made for Government involvement in such projects are reviewed below.

First, Government involvement may be justified if it can be concluded that extreme risk aversion prevents private capital markets from funding advanced air transport projects. Through sponsorship or financial assistance the Federal Government could share project costs and risks and could provide an additional incentive to private parties to provide funding at reasonable costs.

Historically, the U.S. Government has assisted in the financing of risky projects to aid classes of borrowers regarded as poor risks (e.g., small business and minority credit programs), to facilitate very costly projects in the public sector (e.g., subway and sewer construction financing), and to facilitate high-cost/high-risk projects that bear on national security (e. g., shipbuilding and development of the merchant marine). In all of these cases, unusually high financial barriers have prevented private parties (or local governments) from obtaining sufficient capital from private sources for activities that further such broad social goals as equal economic opportunity, national security, and the raising of standards of living among communities.

In the past, Federal support for aeronautical R&D that may have commercial applications, like other R&D, has been accepted in part because innovation is regarded as beneficial to society. It is not clear, however, whether explicit Federal support for advanced air transports can be justified on grounds of broad societal value. Since advanced air transports would benefit directly only those citizens who can afford to fly (and perhaps, of those, only citizens who can afford premium fares), whether Federal aid is appropriate may depend on the perceived societal value of public investments in specific aviation technologies and in the aerospace industry. In this as in other cases, whether a project merits financial aid from the Government is a matter of political as much as economic analysis.

A second argument for Federal involvement is that accelerating development of an advanced air transport might sustain American leadership in relevant technologies, enhance the international competitiveness of American industry, and increase U.S. aerospace exports. Exports of aerospace products are an important factor in the U.S. balance of trade. While the total U.S. balance of trade has been negative since 1976, aerospace trade has had a large positive balance, helping to offset negative balances in other sectors (see table 10).

Note that transport aircraft dominate aerospace trade because of their high unit values (see table 11). Recently, growth in aerospace imports has increased, while growth in aerospace exports has decreased. These trends could contribute to future worsening of the total balance of trade. Government support for advanced air transports, which would have significant export potential, would be one alternative for promoting U.S. aerospace exports as well as U.S. technological leadership. *

There are examples of Government intervention to accelerate technology deployment and influence related economic activity, but they are less common than those of Government intervention in response to unusual financial circumstances. One example is the Tennessee Valley Authority (TVA), which was established to provide for efficient power generation, flood control, river navigation, and agricultural improvement, as well as stimulation of area economic development. The formation of TVA *secured* Federal Government control over the timing, form, and responsibility for projects under its jurisdiction.

Another example is COMSAT, a corporation that was established to transfer communications satellite technology developed with Federal funds to private industry. Among the goals for COMSAT were U.S. technological leadership and avoidance of private monopoly in satellite communications. Although COMSAT deals with aerospace technologies, it is not necessarily an appropriate model for Federal involvement in ad-

*Similar arguments were advanced in favor of the U.S. SST.

Table 10.—Total and Aerospace Balance of Trade

Year	Total U.S. trade balance[a]	Aerospace Trade balance	Exports	Imports	Aerospace trade balance as percent of U.S. total
1960 . . ,	$ 5,369	$ 1,665	$ 1.726	$ 61	31.0%
1961 . . ,	6,096	1,501	1,653	152	24.6
1962	4,180	1,795	1,923	128	42.9
1963.	6,061	1,532	1,627	95	25.3
1964.	7,555	1,518	1,608	90	20.1
1965.	5,875	1,459	1,618	159	*24,8*
1966.. ..	4,524	1,370	1,673	303	*30.3*
1967.	4,409	1,961	2,248	287	*44,5*
1968	1,133	2,661	2,994	333	*234,9*
1969 . .	1,599	2,831	3,138	307	*177,0*
1970..	2,834	3,097	3,405	308	109,3
1971... :::	-2,024[b]	3,830	4,203	373	[c]
1972. .....,,	-6,351	3,230	3,795	565	
1973, . .	1,222	4,360	5.142	782	356.8
1974... ..	-2.996	6.350	7.095	745	[r]
1975	9,630	***7,045***	*7,792*	747	73,2
1976	-7,786	***7,267***	*7,843*	576	
1977,	-28,970	***6,850***	*7,581*	731	[c]
1978..	-31,786	***9,058***	10,001	943	[c]
1979 : :	-27.250	***10,123***	11.747	1,624	[c]
1980	–27,340	11,952	15,506	3,554	
1981	–30,051	13,134	17,634	4,500	[c]

[a]Exports Imports
[b]First negative U S balance of trade since 1888
[c]Not applicable

SOURCE Aerospace Industries Association using Bureau of the Census data

vanced air transport technologies. This is so primarily because a large market for the technologies and related services promoted by COMSAT was established before the corporation was formed, while the market for advanced air transports, especially ASTs, is expected to be much less certain. Because of the anticipated market, the Government was able to structure COMSAT to operate without recourse to Federal funds, while Federal financial support may be necessary to launch advanced air transport projects.

Note that Government has typically intervened to accelerate the deployment of technology to benefit the Nation without creating marketable civilian products such as advanced air transports. A major exception was the U.S. Supersonic Transport (SST) project (1963-71), which had as its goals the advancement of air travel and aviation technology, and the enhancement of U.S. technological leadership, prestige, and foreign trade. Although there were several factors behind the cancellation of the SST project, the experience underscores the political and economic risks of Government involvement in highly complex, narrowly defined, and expensive commercial projects,

In particular, the SST experience suggests that the political acceptability of a commercial project supported by the Federal Government may hinge on specific attributes of the final product, such as fuel consumption, environmental impacts, and accessibility to all socioeconomic groups. The SST experience also suggests that insofar as Government support for the production of specific commercial products is controversial, Government involvement in either nonspecific R&D or marketing activities (e.g., through provision of seed money) may be more acceptable, at least because the financial commitment is less.

Finally, Government involvement in advanced air transport development might protect the

Table 11 .—Exports of Civil Aircraft

	1976-	1977	1978	1979	1980	1981
Total number of aircraft	4,283	4,368	4,399	5.115	4,434	3,826
Helicopters, under 2,200 lbs.	201	233	243	294	335	268
Helicopters, over 2,200 lbs.	114	88	125	165	190	185
Single-engine aircraft ...	2,374	2.664	2,640	2,821	2,172	1,800
Multi-engine aircraft, under 4,400 lbs.	228	273	455	645	546	371
Multi-engine aircraft, 4,400-10,000 tbs.	612	525	339	360	432	426
Multi-engine aircraft, 10,000-33,000 lbs.	4	7	37	52	28	20
Passenger aircraft, over 33,000 lbs..			99	172	215	236
Cargo aircraft, over 33,000 tbs.		, 101	3	13	8	7
Other aircraft, over 33.000 lbs.	5 8		9	15	14	12
Other aircraft, Including balloons, gliders and kites .,	NA	NA	NA	NA	NA	NA
Used or rebuilt aircraft	592	477	449	578	494	501
Total value (millions of dollars)	$3,211	$2,747	$3,625	$6,177	$8,256	P8,613
Helicopters, under 2,200 lbs.	28	38	42	61 t	82	71
Helicopters, over 2,200 lbs.	85	68	114	146	217	275
Single-engine aircraft ...	74	93	103	124	114	105
Multi-engine aircraft, under 4,400 lbs.	17	27	62	94	88	72
Multi-engine aircraft, 4,400-10,000 lbs.	269	262	240	306	454	526
Multi-engine aircraft, 10,000-33,000 lbs	2	6	91	126	83	87
Passenger aircraft, over 33,000 lbs.			2,111	4,128	5,511	6,087
Cargo aircraft, over 33.000 lbs.	2,468	1,936	142	322	480	363
Other aircraft, over 33,000 lbs.			305	548	736	730 ;
Other aircraft, Including balloons, gilders and kites ...	4	4	27	11	5	62
Used or rebuilt aircraft	264	313	388	311	486	235

NA: Not available
NOTE Data prior to 1978 may not be strictly comparable to data for subsequent years due to revision of the export schedule effective in 1978

SOURCE Aerospace Industries Association using Bureau of the Census data

aerospace industry from the instability of the commercial aircraft market. The Government has historically sheltered other industries considered essential to the public interest, including railroads (most notably by creating Amtrak and Conrail); such financial industries as banking, stockbrokering, and commodities trading (through a variety of Government-sponsored corporations'); and others.

Commercial aviation projects, although not themselves objects of policy concern, affect the structure and financial health of the aerospace industry, the allocation of its resources, and the ability of firms to meet military aerospace needs. The Government has already aided Lockheed in recent years (like other aerospace firms earlier) when it foundered on a commercial project, in order to preserve technological knowhow and product competition vital to defense needs. Also, during the 1970's, the Civil Aeronautics Board and some industry analysts promoted legislation to coordinate U.S. commercial aircraft program selection and timing as a means of abating financial pressures and risks in aircraft manufacture.

The Government could choose to become involved in advanced air transport projects in advance both as a prophylactic measure and because an AST or ASUBT project may provide practical experience with technologies applicable to defense

*Such corporations include the Federal Deposit Insurance Corporation, the Securities Investors Protection Corporation, and the Commodity Futures Trading Corporation.

products. However, the public interest in technologies with military applications may be less ambiguously served by explicitly underwriting the development of such technologies for defense applacations. Also, justifying Government involvement in advanced air transport projects as a means to promote the stability of the aerospace industry would likely raise questions about other Government activities that influence the industry, ineluding those that affect its international competitiveness. Other activities may be better alternatives for Government investment in supporting the industry.

CONCLUSION

As the above discussion suggests, advanced air transport projects could be undertaken with either private or public funding or both. If desired, Government involvement could range from financial aid to establishment of a special organization, such as a Government-sponsored corporation. Financial aid alone, which could be provided to individual companies or to joint ventures, can be delivered in a variety of forms (e.g., loans, loan guarantees, grants, special tax incentives). It is, in general, a more limited means of Government involvement than creation of a Government-sponsored organization.

A Government-sponsored organization, which could provide a greater level of Government involvement, could take several forms. As the contrast between TVA and COMSAT illustrates, the form of a Government-sponsored organization would depend on the level of Government funding and participation desired (although a Government-sponsored corporation would have to conform to provisions of the Government Corporation Control Act of **1945).**

Whether, and in what form, the Federal Government would support an advanced air transport program would depend on how policy priorities are perceived, how advanced air transport projects compare with other candidates for the limited Federal assistance dollar, and the extent to which Congress and the Executive choose to bear the risks.