

Weighing Benefits and Costs | 4

As the first report of this OTA assessment pointed out, the risks attached to the proliferation of weapons of mass destruction are considerable. Advocates of strong export controls point out that the costs of proliferation may include thousands or millions of lives, billions of dollars of property destroyed, or, at a minimum, billions of dollars paid for military preparations to deter or do battle against owners of such weapons. Therefore, if export controls could be shown to be effective in preventing proliferation, they might be judged well worth the economic burdens they might place on the national economy or individual exporters.

ASSESSING BENEFITS

The great majority of the world's nations have signed agreements¹ recognizing that the further spread of nuclear, chemical, and biological weapons would be dangerous to international security, and should be opposed. The signatories to these treaties have also agreed that those possessing the wherewithal to produce such weapons should not help other nations do so. The majority of nations able to supply goods and technology needed for producing the weapons have agreed to control exports from their territories as a nonproliferation measure. **Implicit in these agreements is the belief that export controls on at least some items are a useful nonproliferation tool.**

In a world where all the materials, tools, and technology needed to develop and produce weapons of mass destruction (or mis-

The majority of nations able to supply goods and technology needed for producing the weapons have agreed to control exports from their territories as a nonproliferation measure.

¹I. e., the Nuclear Non-Proliferation Treaty (NPT), the Biological Weapons Convention (BWC), and the Chemical Weapons Convention (CWC).

22 | Export Controls and Nonproliferation Policy

siles to deliver them) were readily traded, acquiring the weapons would be cheaper and the time to get or develop them shorter. But how much cheaper and how much shorter? The answer to that question varies widely from country to country, as well as from one type of weapon to another. As noted above, **several key factors affect export control effectiveness:**²

- the nature and level of technical sophistication of the weapon sought,
- the state of industrial and technical development of the target countries,
- the controllability (or degree of general availability) of dual-use items (those with both civilian and military applications),
- the degree of cooperation among all the relevant exporting nations, and
- the degree of success in monitoring and enforcing of controls by each cooperating nation.

■ The Technology Variables

The ability of export controls to block access to needed goods and technology depends strongly on the type of weapon being pursued. So too, does the proliferant's ability to develop alternatives or "work-arounds" to the items it cannot purchase abroad. In evaluating the effectiveness of export controls, therefore, it is important not to lump all weapons of mass destruction together.³

Nuclear Weapons

Export controls have the best chance of effectiveness against nuclear weapon proliferation (compared to that of other types) because the

processes for producing weapon-usable fissionable materials are difficult and costly. Pakistan, for example, had to abandon efforts to produce plutonium when external assistance ended; its uranium enrichment program relied heavily on theft, smuggling, and black market transactions, frequently in violation of export control laws.⁴ South Africa, on the other hand, devised a method of uranium enrichment that relied less on imports (but still received clandestine foreign assistance).⁵ Although it is easier to design and build a primitive bomb once fissionable material has been acquired than it is to produce the material, more advanced designs (improving on size, weight, and explosive yield) require additional infusions of technology.

Chemical Weapons

Export controls can increase the cost and difficulty of producing large quantities of high-quality nerve agents under safe conditions. They may also help keep advanced delivery technologies (e.g., chemical cluster bomb designs) out of the hands of some nations. **Nevertheless, controls are unlikely to block a nation determined to produce chemical weapons.** As industrialization spreads to more countries, so will civilian chemical technologies that can be applied to weapon-agent production. Moreover, with environmental, health, and safety standards rising around the world, modern chemical facilities are increasing] y adopting the type of production technology that formerly had been used only for the most toxic compounds.

²For further discussion of key technologies for each type of weapon, see U.S. Congress, office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks, OTA-ISC-559* (Washington, DC: U.S. Government Printing Office, August 1993) and *Technologies Underlying Weapons of Mass Destruction, OTA-BP-ISC-115* (Washington, DC: U.S. Government Printing Office, December 1993).

³Ibid.

⁴See Leonard S. Spector With Jacqueline R. Smith, *Nuclear Ambitions: The Spread of Nuclear Weapons, 1989-1990* (Boulder, CO: Westview Press, 1990), pp. 90-91.

⁵Ibid., pp. 270-271.

To a certain extent, the Chemical Weapons Convention (CWC) will compensate for the declining utility of export controls: the Convention's verification measures will constitute a kind of "post-shipment end-user check" for trade in precursor chemicals and chemical manufacturing equipment, since suspicious locations will be subject to challenge inspections. (The Treaty will also ban the transfer of chemical weapon precursor chemicals to non-CWC parties.)

Biological Weapons

The basic equipment and raw materials needed to grow biological warfare agents are in widespread use for commercial food processing and pharmaceutical purposes. As knowledge of biotechnology spreads, so will the ability to produce large amounts of agent in small facilities. **Export controls are unlikely to be a strong bar to the acquisition of biological weapons.**

Missiles

Successful missile export controls will not prevent the countries now suspected of having weapon-of-mass-destruction programs from finding ways to deliver such weapons. These nations have combat aircraft that could do the job. Some of them already have relatively short-range ballistic missiles. Any of them could also utilize less conventional means of delivery. In addition, most could probably derive at least simple cruise missiles from small airplanes or unmanned aerial vehicles. Nevertheless, **missile export controls can help limit the spread of such advanced missile technologies as precision guidance, staged long-range ballistic missiles, advanced reentry vehicles, and long-range cruise missiles.** A frequently cited case of successful export control action is the blockage of "Condor"* solid-fueled mis-

sile technology from Argentina to the Iraqi "Badr 2000" missile program.

I The Cooperation and Enforcement Variables

Only since 1984 for chemical weapons, and 1992 for nuclear and biological weapons, have international groups of supplier nations agreed on a multilateral basis to control the exports of specified dual-use commodities that might be used to produce those weapons. These groups include most, but not all, of the major potential suppliers of the items in question. (A significant exception for all three groups is China.) An important immediate task is to gain the cooperation of the newly independent states of the former Soviet Union.^b As industrialization spreads, more countries become potential suppliers and, therefore, potential candidates for membership in the supplier groups. This can be a complicated problem when one of the targets of an export control regime is also a potential supplier.⁷

Supplier-group export controls can be useful even if all possible suppliers do not adhere fully to them. First, most nations and companies do not wish to contribute to the proliferation of weapons of mass destruction. The information shared by multilateral export control groups helps their members identify potential misusers of their products, and thereby lets them avoid inadvertent involvement in such programs. Second, in an environment of broad international consensus that certain kinds of exports should be controlled, there is a greater chance that pressure of various kinds can be brought to bear on the few nonparticipants to limit or end their offensive behavior.

Even with nominal international agreement on export controls, however, there has been wide variation in how the controls are interpreted and enforced by each nation. First, the

⁶See forthcoming OTA report on proliferation issues and the former Soviet Union.

⁷See ch. 5 for further discussion of emerging suppliers among developing nations.

24 | Export Controls and Nonproliferation Policy

criteria for withholding export licenses are subject to the judgment of each state's licensing authorities.⁸ For example, Russia, although not a member of the Missile Technology Control Regime (MTCR), had agreed to abide by its restrictions on the transfer of rocket-related technology. At the same time, it planned to sell both hardware and production technology for cryogenic rocket motors to India. India and Russia argued that this was technology suitable only for space-launch vehicles and not applicable to military missiles. The United States, however, argued that the terms of the MTCR forbade the transfer of such technology to a country such as India with a military missile program.⁹ Implementation of the Nuclear Suppliers' Group (NSG) dual-use export control guidelines (see below) is also up to the discretion of each member, but the members do undertake not to undercut transfers refused by other states.

Even if interpretations of export control agreements among the participants were always in harmony, the related laws, implementing regulation, and administrative practices are unlikely to be uniform. National export control systems vary widely in:

- the degree of detail in legislation and regulations,
- the administrative resources for managing the system,
- the information available to the licensing officials,
- ▷ the numbers and skills of customs officials,
- the degree or lack of corruption in administration and enforcement,
- = the resources devoted to enforcement operations, and
- ~ the legal sanctions available for punishing violators of export control regulations.

Weaknesses in one or more of these factors offer opportunities for proliferant organizations to circumvent export controls and smuggle out or divert at least some of the commodities they want. Even so, from the standpoint of the potential buyer of controlled commodities, controls that are only partially enforced still present difficulties. First, the buyer has to go to the trouble and expense of finding a sufficiently unscrupulous seller. Second, even if some items are available in small numbers from such sellers, the buyer may need larger quantities than backdoor deals can supply. Third, he may not be able to obtain the necessary technical services and spare parts to keep his diverted equipment running. Fourth, he may have to resort to costlier methods of production than if he had full access to international markets. Fifth, discovery of one or more illicit transactions may tip off exporting states about the program for which the purchase is being made, and thence lead to counteractions.

Much of Eurasia now poses new problems in the harmonization of export control practices. First, in the European Union (EU, formerly the European Economic Communities), the emergence of a truly common market in which most controls may not be applied to intra-Union trade will mean that the strength of export control enforcement will depend on the weakest links. That is, if goods or technology move freely within the Union from countries with strong export control machinery to other countries with weaker enforcement, they may leak out of the region to potential proliferants. As EU negotiations on export controls have proceeded, Germany (with the strictest current export control regime) had argued for

⁸In the COCOM regime, members referred proposed exports of listed items to an administrative headquarters, and any member could veto a license approval.

⁹US policymakers were more concerned over the potential military utility of some of the technology being transferred to India than they were over the cryogenic liquid-fueled motors themselves. In July 1993, Russia agreed to adhere completely with the U.S. interpretation of MTCR requirements and to withhold the further transfer of rocket motor production technology to the Indian space program. However, much documentation had previously been shipped. The Russians would also proceed with the sale to India of four of the rocket motors themselves.

common regulations as strict as its own; apparently losing that struggle, it has promoted a rule allowing individual EU members to enforce controls that are stronger than the Union's regulations.¹⁰

Meanwhile, to the east, most of the republics of the former Soviet Union still lack effective customs controls over their borders, let alone stringent export control policies for dual-use technologies. This means that commodities that the nonproliferation supplier groups are trying to control may leak not only from one former Soviet republic to another, but beyond the former Soviet boundaries as well.¹¹

In sum, many variables conspire to weaken the effects of export controls on programs to make weapons of mass destruction. But to say that export controls are sometimes ineffective is also to say that they are sometimes effective. Although some would-be proliferant nations may be able to work around many supplier controls, others may lack the resources to do so. **Even if it is not possible to estimate the deterrent effect that export controls may have on the calculations of some nations deciding whether to pursue weapons of mass destruction, it is logical to assume that there is such an effect.**

For those states that pursue weapons of mass destruction in spite of controls, the costs and delays may be important. For example, without export controls on nuclear-weapon related commodities, one can easily imagine that South Africa could have built dozens of nuclear weapons rather than 6, and that it might have then been more reluctant to eliminate its arsenal and join the NPT. To take another example, without the barrier, such as it was, of export controls, Iraq might have built nuclear weapons before it invaded Kuwait, dramatically changing the context for operations Desert Shield and Desert Storm. Denials of for-

eign technology probably helped slow the Argentine and Brazilian nuclear programs until those countries were ready to join the nonproliferation regime. In short, export controls on some items, even if imperfect, may help buy time that makes a crucial difference.

The cost and delay that export controls impose on proliferants is probably impossible to quantify, or even to estimate qualitatively. **Thus policy-makers confront a dilemma as they contemplate how to enact and administer an export control regime: the benefits, while potentially great, are essentially intangible and long-term, and accrue to the nation as a whole; the costs, however, are more palpable and immediate, and are unevenly imposed across a few firms and industries.**

ESTIMATING COSTS

Like any regulatory regime, export controls impose costs both on the government and on the industries regulated, and those costs can be both direct and indirect. For the U.S. government, the direct costs are those born by the administering agencies (see table 3-1). Since some officials only handle export control issues as part of their work, even the direct costs of export controls to the government are hard to estimate. Moreover, **since limiting the spread of weapons of mass destruction and missiles is only one of many objectives of the U.S. export control regime, estimating the cost of nonproliferation controls alone is also difficult.** The indirect costs of export controls to the government may include the following:

- time and attention of high-level officials drawn away from other nonproliferation and foreign policy issues,

¹⁰See H. Müller et. al., *From Black Sheep to White Angel? The New German Export Control Policy*, PRIF Reports No. 32 (Frankfurt am Mare, Germany: Peace Research Institute Frankfurt, January 1994), p. 56. The authors point out, however, that pressures from German businesses claiming unfair disadvantages relative to their EU competitors will result in weakening of German regulations as well.

¹¹See forthcoming OTA report on the proliferation implications of the breakup of the former Soviet Union

26 | Export Controls and Nonproliferation Policy

- diplomatic or economic concessions made in bargaining with other nations for cooperation on export controls, and
- damage to diplomatic or economic relations ensuing from imposition of export controls on foreign nations or of sanctions against foreign violators of U.S. export regulations.

As will be pointed out below in the section on “Strengthening Multilateral Controls” (ch. 5), some policy options for increasing multilateral cooperation are likely to meet considerable resistance from other members, or from prospective members, of the international export control regimes. Pursuit of these measures might cost the United States considerable geopolitical capital, and might require that other U.S. goals in dealing with those nations (e.g., promoting human rights in China) be subordinated to the nonproliferation goal.

Officials and journalists from some developing nations have expressed the view that export controls are aimed less at preventing proliferation than at blocking the diffusion of advanced civil i an technology from industrialized nations to new competitors.¹² A biological weapons expert involved in international activities related to the Biological Weapons Convention (B WC) argues that this view may become a major obstacle to winning developing nations’ cooperation in possible efforts to add verification measures to that agreement.¹³

In economic terms, the heaviest price for export controls is paid by the exporting firms whose products are subject to regulation. **Industry representatives testifying before Congress and elsewhere have complained that current U.S. export controls hamper their companies’ export competitiveness in several ways.**

First are direct costs. The most obvious direct cost is the loss of business that would have been permitted in the absence of controls. The government tells companies that they may not make certain sales because doing so would in some way harm the national interest. The value of export license applications denied gives some measure of this lost business. There are presumably many other sales, however, that companies do not bother to try to make because they have reason to believe that an export license would be denied.

Another direct cost of export controls is administrative: tracking massive and complex U.S. export regulations and then assuring company compliance imposes time, money, and personnel costs. In part, the regulations are so complex because they spell out so many exceptions to the general rules. Nevertheless, exporting companies need to track the rules and exceptions. In some cases, smaller companies may find the burdens so great that they forgo exports entirely.

Company compliance problems may be complicated by the de facto absence of public identification of all controlled commodities and end-users. A “knows or is informed” regulation requires individual validated licenses (IVLS) for any exports that might be “directly employed in” the design, development, acquisition, or use of missiles or chemical or biological weapons in a country listed in one of the supplements to the Export Administration Regulations. An exporter who has even “reason to know” that items or data might be used *directly or indirectly* in a nuclear program must also apply for a license. Such rules at least to some extent shift regulatory and intelligence-gathering burdens onto exporting companies.

However, the Department of Commerce (DOC) also offers guidance about what an export-

¹²Although this perception may exist, it does not appear to be born out by the facts. In 1992, for example, the DOC approved 1,483 licenses, representing potential exports valued at \$319.5 million, for the export of items controlled for chemical or biological weapon proliferation reasons; it denied only 24 such licenses, valued at \$7.4 million.

¹³Barbara Hatch Rosenberg personal communication, Mar. 24, 1994. At present, the BWC has no verification provisions. Several nations have proposed that a regime of compliance monitoring be added to the Convention.

er can reasonably be expected to do to avoid customers who may be engaged in inappropriate end-uses. Before December 1993, the “know” rule seemed to apply to *any* items going to a proliferant end-user. In that month, however, the DOC issued a Guidance statement intended to ease exporter concerns that the rules might be arbitrarily enforced.¹⁴ It should be pointed out that no company before or since that guidance was issued has actually been penalized for failing to apply for an IVL while knowing or having reason to know that the end-user was a suspected proliferant.¹⁵

It now remains to be seen whether corporate concerns about the “know” rule will be assuaged by the new guidance or not. In the past, companies have also argued that the “is informed” part of the rule was unfairly applied, with some companies being informed that certain buyers were unacceptable and others not being informed; those not informed were then left able to make sales from which their competitors were unfairly barred. Commerce officials have acknowledged this problem of uneven information and said they are addressing it.

An IVL entitles the exporter to ship a specified quantity of licensed items to a particular destination for a period of up to 2 years. For some items and destinations, a company may be able to avoid applying for an IVL by obtaining a “distribution license”

... that authorizes exports of certain commodities under an international marketing program, generally to three or more consignees that have been approved in advance as foreign distributors or users. This procedure is a special privilege reserved for firms with a thorough knowledge of and experience with the Export Administration Regulations, and an internal control mechanism

to assure strict compliance with the requirements of the license.¹⁶

Although this program may relieve the exporter of the need to apply for IVLS in many cases, it does require the license holder to monitor more closely the behavior of its buyers and of its own compliance with regulations. On the other hand, DOC officials report that some exporters say their competitive abilities have actually been strengthened by the additional information that internal control mechanisms provide to their decision makers. **For the purposes of this report, note that distribution licenses, with very few exceptions, do not apply to nonproliferation items; therefore, whatever the cost burdens-or benefit-of distribution licenses, they cannot be attributed to nonproliferation controls.**

A complete accounting of the direct costs to U.S. industry of compliance with export control regulations is not available, but some information is. A 1992 industry-sponsored survey of 42 large exporters found that 30 to 40 percent of their exports required IVLS, and that these companies averaged 24 employees and \$1.3 million a year each on licensing and compliance.¹⁷ One large U.S. exporting firm with \$14 billion in annual sales and \$4 to \$5 billion in annual exports in the early 1990s reportedly maintained a 100-person export licensing department costing several tens of millions of dollars per year.¹⁸

Unfortunately, the study’s sponsor, the National Association of Manufacturers (NAM), did not release any details about the study, such as which firms were surveyed and what fractions of their business costs were attributable to export control compliance. With 30 to 40 percent of their exports requiring licenses, it is clear that these firms were

¹⁴58 *Federal Register* 68029-68031 (Dec. 23, 1993).

¹⁵For further discussion of the “know” and “reason to know” rules, see below, chs. 5 and 6.

¹⁶Export Administration Regulations, 15 CFR § 773.3 (Jan. 1, 1993).

¹⁷National Association of Manufacturers survey as reported in *International Trade Reporter*, Aug. 26, 1992, p. 490 and cited by J. David Richardson, *Sizing Up U.S. Export Disincentives* (Washington: Institute for International Economics, 1993), p. 38, footnote 16.

¹⁸Richardson, *ibid.*, p. 37; the firm was not named.

TABLE 4-1: Value of Exports Requiring Validated Licenses Is a Relatively Small Percentage of Total Exports, 1992

Type of exports	Total exported	Approved (\$17.8 B)	Returned w/o action (\$5.3 B)	Denied (\$0.812 B)	All applications (\$23.9 B)
All goods and services	\$640.5 B	2.8%	0.8%	0.1%	3.7%
Industrial supplies and capital goods	\$282.1 B	6.3%	1.9%	0.37%	8.5%
Advanced technology	\$107.1 B	16.6%	4.9%	0.8%	22.3%

NOTE: Many license applications returned without action may have been refiled later and been counted again in the "Approved" column. The "Industrial supplies and capital goods" and the "Advanced technology" categories are separately derived and probably contain considerable overlap. SOURCE: Department of Commerce and John Sullivan Wilson, "The U.S. 1982-93 Performance in Advanced Technology Trade", percentages by Office of Technology Assessment.

not representative of U.S. exporters as a whole, since a much smaller fraction of all exports is subject to licensing (see table 4-1). In addition, as with the few other studies in this field, there is no way to determine what portion of the license activity and its costs could be attributed to nonproliferation export controls as opposed to other kinds.

Finally, **even in the absence of export controls, companies may find it worthwhile to monitor the character of their buyers: most companies would prefer not to contribute to the violation of U.S. and international nonproliferation norms**, and they certainly do not want the bad press that can come from revelations that they have done so.

More difficult to measure are the indirect costs of lost business attributable to export controls. In at least some cases, the export license review and approval process seems to have taken so long that potential buyers have sought other suppliers in other countries who could deliver orders more promptly. In other cases, the Office of Export Licensing approves export only with conditions intended to assure that the items will be used for stated purposes at stated places. One such condition is the requirement for a reexport license: the buyer must agree to apply to the U.S. govern-

ment if he wishes to transfer the commodity to a third country. Another condition is sometimes that the end-user must agree to accept inspections by U.S. personnel to assure that the items are being used for the stated purpose.

Rather than accept these conditions, buyers may seek other suppliers in other countries that do not impose them. Again, in the case of nonproliferation controls, other members of the multilateral export control groups also require permission to reexport. Finally, when buyers either are deterred from ordering in the first place or cancel orders because of licensing delays, the would-be exporter may lose not only the initial deal, but any follow-on orders that might have succeeded it. Although it is logical that export losses result from these factors, direct, or even indirect, statistical evidence is hard to come by.

Whatever the burdens of the export control system on industry, it is important to keep in mind, as noted at several points above, that only some export controls are imposed for nonproliferation reasons (see next section). **Several of the most prominent industry problems have not been with controls directly related to the means of producing weapons of mass destruction, but**

¹⁹For the results of one effort to detect U.S. export shortfalls to other COCOM members, see Richardson, *ibid.*, pp. 102-103. The author concluded that his research findings did not support the hypothesis that trade with COCOM partners was adversely affected.

with controls imposed for other purposes. In these instances, the industry objections have been not just to the burdens of the licensing process, but to specific license denials. For example, high-speed telecommunications switching equipment is on the “national security” list of items requiring IVLS. Until the end of March 1994, the U.S. government blocked the sale of such equipment to China on unspecified national security grounds. Manufacturers argued that they were losing millions of dollars in sales of equipment that the Chinese would either buy elsewhere or end up making for themselves, thereby frustrating the U.S. export denial purpose anyway.²⁰

The most ambitious attempt at estimating the losses attributable to export controls estimated that national security export controls on dual-use items to Communist countries cost between \$4.5 and \$20 billion in lost exports in 1989, while trade sanctions against several other countries cost between \$2.4 and \$3.1 billion.²¹ The author of that study later estimated that for 1993, these controls may have cost \$20 billion, and perhaps as much as \$30 billion, in U.S. exports a year.²² However, there are many uncertainties in such an analysis; moreover, projecting the findings of that study into the future seems questionable, given the end of the Cold War, the decline in Coordinating Committee for Multilateral Export Controls (COCOM), the relaxation of controls on computers and telecommunications equipment, and the collapse in buying power of the former Communist countries. This method also provides no direct way of disaggregating the effects of different *types* of export controls on the larger economic picture.

For further illustration of the difficulties of estimating the economic impact of nonproliferation export controls, see appendix A.

Beyond the immediate effects on individual company profits, reduced (or constrained) exports can mean a worsened balance of international payments for the U.S. economy. In terms of dollar volume of exports, however, the potential impact of export controls appears to be relatively small—and declining. Table 4-1 shows that in 1992, the total value of U.S. exports for which applications for IVLS were received (\$23.9 billion) amounted to about 3.7 percent of all 1992 exports of goods and services, about 8.5 percent of exports of industrial supplies and capital goods, and about 22.3 percent of those of one analyst’s estimate of advanced technology exports. (Note that IVLS are generally valid for 2 years, so the value of the items in a license applied for in a given year does not necessarily correspond to the value of the shipments the exporter intends to make during that year. On the other hand, other exports, approved in the prior year, may be shipped during that year.) The dollar value of license applications either denied or returned to the applicant without action²³ in 1992 represented only about 1 percent of total U.S. exports in that year, while the value of licenses actually denied amounted to about one-tenth of 1 percent.

Figure 4-1 shows that both the number of transactions for which an IVL was required, as well as the value of the items represented, has declined dramatically since 1989. This decline is due mainly to the relaxation of COCOM controls (see be-

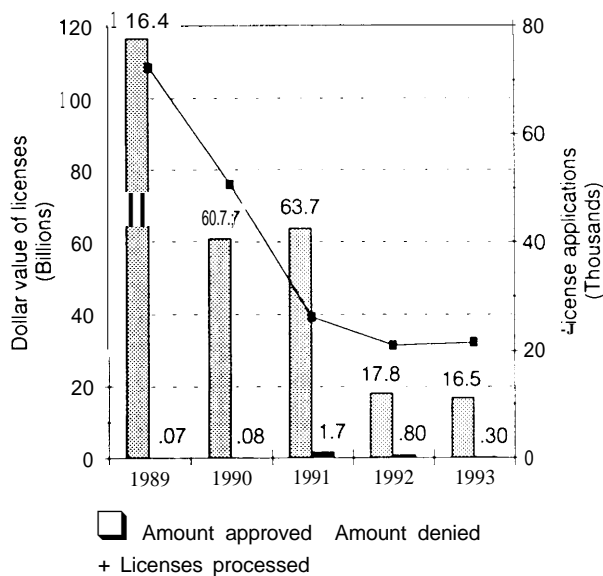
²⁰Some also argue that denial of U.S.-made items may cause a country to develop indigenously the technology that they could not buy abroad, having some potential for creating or fueling foreign competitors for U.S. exporters of those items.

²¹Richardson *op. cit.*, footnote 17, pp. 96-97. Amongst countries of proliferation concern on the latter list, Iran accounted for the largest export shortfalls, estimated between \$1.3 and \$1.8 billion.

²²Richardson, “Economic Costs of US Export Controls.” Statement before the Subcommittee on Economic Policy, Trade, and Environment, Committee on Foreign Affairs, U.S. House of Representatives, Nov. 18, 1993.

²³Applications may be returned to the applicant without action because they are incorrectly or incompletely filled out, or because the DOC requires additional information to make a decision. As the DOC tallies licensing activities, resubmitted applications, if approved or denied, are counted again under those categories. Therefore, one should not assume that a license returned without action represents an export that is never approved.

FIGURE 4-1: Value of Individual Licenses Declining



The bars in this graph indicate the values of Individual Validated Licenses approved or denied by the Department of Commerce in the years shown, while the line markers (see right-hand scale) show the combined numbers of licenses approved or denied. Many license applications each year are "Returned Without Act/on" (RWA) because they are improperly filled out or because more information is needed. Of the applications RWA, some may not be refilled while others may be, the latter are then considered to be new applications and may enter the counts of those approved or denied. Note that license approvals are 2-year authorizations to export, and that exporters do not report to the Commerce Department whether the licenses are fully utilized or not. Therefore, the dollar amounts approved for export do not represent actual values of goods shipped in any given year.

SOURCE Department of Commerce, 1993, and Office of Technology Assessment 1994

low), which is likely to continue, whatever COCOM-successor arrangements are negotiated. In the fall of 1993, the DOC announced easing of

controls on computers, which would mean a further decline in licensing, since computers accounted for about \$8 billion in individual licenses in 1993 (see app. B on computer export controls). At the end of March, 1994, as COCOM was abolished, the DOC announced further relaxation of controls on telecommunications and computing equipment. It estimated that the number of IVLS required annually would drop to half of the 1993 level.

By the nature of the commodities, technology, and software controlled, the burdens of export controls do fall more heavily on certain high-technology industries (see app. A). To the extent that the controls of these industries' exports lead to loss of business, they lead also to the loss of higher paying jobs and of tax revenues.²⁴ In addition, if some U.S. high-technology industries were to decline, the U.S. military might lose the benefits of their research and products. In explaining a Clinton administration relaxation of export controls on computers, then-Deputy Secretary of Defense William J. Perry said:

We're an important customer [of the computer industry], but we're no longer a dominant customer. Basically, our strategy today in computers is to get on the shoulder of the computer industry and take advantage of the developments which are taking place.²⁵

That is, the Defense Department's ability to embed advanced computer technology in its weapon systems depends increasingly on advances made first in the commercial sector. Thus Secretary Perry argued that the relaxation of control levels was justified in part because of the strategic benefit of reducing the burden on the industry and enhancing its exports.

²⁴John Sullivan Wilson points out that

Workers employed in high-technology industries receive higher levels of compensation than all other goods-producing businesses, and the premium paid these workers is growing. . . it is clear that, to the extent the United States continues to pursue a trade policy that is focused on the opening of global markets and trade expansion, this will provide for greater employment opportunities in relatively better-paying, high-technology jobs.

See "The U.S. 1982-93 Performance in Advanced Technology Trade," *Challenge*, January-February 1994, p. 16. Wilson also points out that although available data indicate that the United States has been doing well in high-technology exports, trade and technology policy makers need better data sets than those now collected.

²⁵William J. Perry, transcript of Breakfast with Reporters, Oct. 15, 1993 (venue not stated).