A Primer on the Arms Trade

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Among the many consequences of the recent Persian Gulf War was a heightened interest in the international trade in armaments, with some analysts forecasting a substantial increase. While the spotlight has been on the military and political aspects of this trade, economic considerations are also important, and, indeed, are closely interwoven with the political and military aspects. This article presents a survey of the arms trade, focusing chiefly on the economic features.

A Profile of the Arms Trade

According to the leading source, at least 120 countries participated in the arms trade in 1989, the latest year for which data have been published.[1] All 120 were importers, and 47 of them also exported. Ninety-three of those participating in the trade were less developed countries, and they accounted for three-quarters of all arms imports and one-tenth of arms exports, by value. By geographic region, the Middle East was the leading importer, purchasing $12 billion of foreign-supplied arms, while the Warsaw Pact, with exports of $21 billion, was the primary exporting region. International transactions in arms have been increasing in both value and quantity since the mid 1980s—but not so rapidly as world trade—and accounted for about 1½ percent of world trade in 1989.

The magnitude of the arms trade, of course, depends on how arms are defined. Stones can be deadly weapons, yet hardly belong in the same category as Scud missiles. In the case of many other items, the decision is not so easy. For example, chemicals that form the essence of certain weapons can also be put to peaceful uses. The unavoidably arbitrary element in classifying such items calls to mind the assertion of Lewis Carroll's Humpty Dumpty: "When *I* use a word, it means just

Table 1
Arms Exports of Leading Arms-Exporting Countries

1989				1985–89, Cumulative		
	Arms Exports				Arms Exports	
Country	In Millions of Dollars	As a Percent of World Total	Percent Change, 1985–89	Country	In Millions of Dollars	As a Percent of World Total
Soviet Union	19,600	43.14	15	Soviet Union	102,200	39.86
United States	11,200	24.65	1	United States	60,600	23.64
United Kingdom	3,000	6.60	100	France	18,300	7.14
France	2,700	5.94	−50	United Kingdom	14,500	5.66
China-Mainland	2,000	4.40	196	China-Mainland	8,275	3.23
West Germany	1,200	2.64	−14	West Germany	6,400	2.50
Czechoslovakia	875	1.93	−45	Czechoslovakia	6,100	2.38
Israel	625	1.38	−14	Poland	5,700	2.22
Sweden	575	1.27	174	Israel	3,155	1.23
Canada	410	.90	−25	Italy	2,840	1.11
North Korea	400	.88	14	Canada	2,735	1.07
Poland	400	.88	−69	Bulgaria	2,185	.85

Source: U.S. Arms Control and Disarmament Agency (1991), Table II.

what I choose it to mean—neither more nor less."[2]

Recognizing that any definition will be rather arbitrary, we adopt, for purposes of measurement, the definition used by the U.S. Arms Control and Disarmament Agency: arms are military equipment, "including weapons of war, parts thereof, ammunition, support equipment, and other commodities designed for military use." This ACDA definition embraces tactical guided missiles and rockets, military aircraft, naval vessels, armored and nonarmored military vehicles, communications and electronic equipment, artillery, infantry weapons, small arms, ammunition, other ordnance, parachutes, and uniforms. Dual use equipment—which can be used either for military or civilian purposes—is included when its primary mission can be identified as military, although all foodstuffs, medical equipment, petroleum products, and other such supplies are excluded. Also counted in arms transfers are the construction of defense production facilities and licensing fees paid as royalties for the production of military equipment, when they are incorporated in military transfer agreements by countries other than the United States. Missing from this list is strategic weaponry, but ACDA flatly asserts, "There have been no international transfers of strategic weaponry."[3]

Which countries, then, are the chief exporters and importers of arms so defined? In Tables 1 and 2 the leading exporting and importing countries are listed in order of magnitude of their exports and imports. Among the exporters, the dominance of the Soviet Union is striking, although the United States also is prominent, with exports far greater than all countries but the Soviet Union. Between them the Soviet Union and the United States accounted for nearly two-thirds of the world's arms exports over the period 1985–89, and for slightly more than two-thirds in 1989.

Remarkable changes in arms exports are reported for some countries. Between 1985 and 1989 increases of 100 percent or more accrued for the

[1] Unless otherwise indicated, data are from U.S. Arms Control and Disarmament Agency (1991).

[2] Lewis Carroll, *Through the Looking-Glass and What Alice Found There*, in *The Complete Works of Lewis Carroll* (New York: Random House, 1974), p. 214.

[3] The information in this paragraph, including the quotations, is from U.S. Arms Control and Disarmament Agency (1990, p. 137). That page also notes that the ACDA definition of arms transfers includes military services such as construction, training, and technical support—except for the United States, which ordinarily makes much larger transfers of such services than other countries do.

Table 2
Arms Imports of Leading Arms-Importing Countries

1989				1985–89, Cumulative		
	Arms Imports				Arms Imports	
Country	In Millions of Dollars	As a Percent of World Total	Percent Change, 1985–89	Country	In Millions of Dollars	As a Percent of World Total
Saudi Arabia	4,200	9.27	11	Saudi Arabia	23,200	9.05
Afghanistan	3,800	8.38	485	Iraq	22,500	8.78
India	3,500	7.72	35	India	16,200	6.32
Greece	2,000	4.41	567	Iran	10,100	3.94
Iraq	1,900	4.19	−59	United States	10,000	3.90
United States	1,600	3.53	−11	Afghanistan	9,750	3.80
Japan	1,400	3.09	40	Cuba	8,700	3.39
Iran	1,300	2.87	−32	Vietnam	8,300	3.24
Vietnam	1,300	2.87	−13	Syria	7,100	2.77
Cuba	1,200	2.65	−50	Israel	6,025	2.35
Turkey	1,100	2.43	144	Angola	5,950	2.32
Syria	1,000	2.21	−38	Soviet Union	5,900	2.30

Source: U.S. Arms Control and Disarmament Agency (1991), Table II.

United Kingdom, China, and Sweden. By contrast, France, Czechoslovakia, and Poland experienced major percentage decreases in their arms sales (Table 1).

While only two countries account for the preponderance of arms exports, no such dominance is to be found among the arms-importing countries. Although Saudi Arabia has led the pack of importers, it absorbed only about 9 percent of the world's arms imports during 1985–89, and Iraq was close on its heels (Table 2). Of course, among the leading importers are countries, including a number in the Middle East, that have been involved in conflict or have been imminently threatened with it, including civil strife. Extraordinary percentage increases in imports between 1985 and 1989 are reported for Afghanistan, Greece, and Turkey.

A nation's arms trade may loom large relative to that of other countries but still be small relative to the nation's total economic activity. As can be seen in Table 3, the country whose arms exports have been the largest in relation to its gross output is Israel, followed closely by North Korea. Other countries that rank very high by this criterion over the period 1985–89 include a number of communist or formerly communist countries.

From the table it is obvious that being an arms seller does not assure prosperity for a country. Per capita GNP is low by world standards for most of the 12 countries that led the world in terms of arms exports as a share of GNP in 1989. Conspicuous by its absence from this list is the United States, whose arms exports averaged 0.27 percent of GNP in 1985–89 and 0.22 percent in 1989, and whose 1989 GNP per capita amounted to $20,910.

If arms exports do not assure prosperity, arms imports can represent a direct economic burden. One measure of that burden—arms imports as a percent of GNP—is reported in Table 4 for the highest-ranking countries.[4] The Middle East is well represented on this list, as are countries that have suffered internal strife. None of the 12 is among the world's wealthy countries in terms of per capita GNP, and most are among the world's poorest.

The exports of some countries are much more heavily concentrated, or specialized, in armaments, than are the exports of others. In Table 5 "relative export specialization" is the ratio of a country's arms exports to its total exports, divided by the ratio of

[4] This measure overstates the burden to the extent that arms are granted to, rather than purchased by, the recipient. Comprehensive data on arms grants are not available.

Table 3
Leading Countries in Arms Exports as a Percent of Gross National Product (GNP), 1989 and 1985–89

1989			1985–89 Average[a]	
Country	Arms Exports as Percent of GNP	GNP per Capita (in U.S. Dollars)	Country	Arms Exports as Percent of GNP
Israel	1.39	10,340	Israel	1.61
North Korea	1.33	1,427	North Korea	1.32
Soviet Union	.74	9,226	Czechoslavakia	1.14
Czechoslavakia	.71	7,876	Bulgaria	.98
Chile	.69	1,809	Soviet Union	.85
Egypt	.53	1,342	Jordan	.75
United Kingdom	.36	14,580	Poland	.73
China—Mainland	.33	547	Chile	.73
Bulgaria	.32	5,530	Yugoslavia	.54
Sweden	.31	21,900	France	.45
France	.28	17,000	United Kingdom	.40
Yugoslavia	.26	2,474	Portugal	.36

[a]A simple average of arms exports as a percent of GNP taken individually for each year 1985–89, using current dollar figures. Afghanistan, Cambodia, Iraq, Laos, Lebanon, Mongolia, and Vietnam are excluded from the 1985–89 average rankings because ACDA lists their GNP data as not available for some or all of the years.

Note: Because of problems with data, Mali and Cape Verde are excluded from these rankings.

Source: U.S. Arms Control and Disarmament Agency (1991), Tables I and II.

Table 4
Leading Countries in Arms Imports as a Percent of Gross National Product (GNP), 1989 and 1985–89

1989			1985–89 Average[a]	
Country	Arms Imports as Percent of GNP	GNP per Capita (in U.S. Dollars)	Country	Arms Imports as Percent of GNP
Nicaragua	38.88	305	Nicaragua	42.95
Yemen (Aden)	18.07	509	Angola	22.86
Ethiopia	15.52	120	Yemen (Aden)	22.02
Angola	12.44	727	Mozambique	17.60
Sao Tome & Principe	11.11	368	Sao Tome & Principe	14.98
Mozambique	10.85	78	Ethiopia	14.48
Vietnam	9.15	219	Guinea-Bissau	12.36
Equatorial Guinea	8.00	347	Jordan	10.02
Yemen (Sanaa)	6.20	976	Syria	8.17
Guinea-Bissau	5.99	171	Yemen (Sanaa)	6.01
Syria	5.18	1,608	Cuba	5.37
Saudi Arabia	4.58	5,600	Saudi Arabia	5.36

[a]A simple average of arms imports as a percent of GNP taken individually for each year 1985–89, using current dollar figures. Afghanistan, Cambodia, Iraq, Laos, Lebanon, Mongolia, and Vietnam are excluded from the 1985–89 average rankings because ACDA lists their GNP data as not available for some or all of the years.

Source: U.S. Arms Control and Disarmament Agency (1991), Tables I and II.

worldwide arms exports to total world exports. Thus, it is a measure of how concentrated a country's exports are in armaments relative to the same kind of concentration for the world's exports. Also, the measure is equivalent to the ratio of a country's arms exports to worldwide arms exports, divided by the ratio of the country's total exports to world total exports.

Among the leading arms exporters, the Soviet Union has ranked highest in relative export special-

ization in armaments. As indicated in the table, the share of its exports accounted for by arms has been almost 10 times as great as the share of the world's exports accounted for by arms. Put another way, the Soviet Union's share of world arms exports has been nearly 10 times its share of all world exports. None of the other leading arms suppliers comes close to this degree of specialization in armaments. Israel is a distant second, followed by Poland and the United States.

A corresponding measure of the concentration of imports in armaments reveals that Afghanistan, Iraq, and Syria have ranked foremost among the leading arms importers for which data are available (Table 5). For Afghanistan, torn by civil war involving superpower rivalry, the reported share of imports consisting of arms has been more than 90 times the corresponding share for the world. In other words, Afghanistan's share of world arms imports has been more than 90 times its share of all world imports. As might be expected, countries with the highest degrees of relative export specialization do not display the highest degrees of relative import concentration.

This profile of the arms trade is not etched in granite. The trade is continually changing with the course of events, and is surely being reshaped by the remarkable developments of the past few years, including the revolutionary changes in the Soviet Union and Eastern Europe and the war in the Persian Gulf.

The Arms Trade of the United States

A more detailed discussion of the arms trade requires more detailed data, but such data are meager both in quantity and in quality. For the United States, if not for other countries, more detailed data are available, but discrepancies between data published by different sources pose a dilemma for the analyst. The problem is nicely illustrated by the differing figures for U.S. arms exports that are reported by the Arms Control and Disarmament Agency and by the Commerce Department, which issues the more detailed data in terms of value. For total exports in 1989, for example, ACDA reports the figure of $11.2 billion (Table 1), while Commerce reports the figure of $8.3 billion (Table 6). Thus, the share of total U.S. merchandise exports consisting of arms in 1989 would be 3.1 percent by ACDA's reckoning but only 2.3 percent by Commerce's tally.

Although no reconciliation of this difference is available, some contributing factors can be identified. Perhaps most important, the ACDA data include transfers from U.S. military facilities abroad to foreign residents, while the Commerce data exclude these transfers. Also, shipments of military goods from the United States to foreigners through Defense Department channels may be reported more fully to ACDA than to Commerce. And ACDA data include

Table 5
Relative Export Specialization and Import Concentration in Armaments, for the Ten Leading Arms Exporters and Importers, Cumulative 1985–89

Country	Relative Export Specialization	Relative Import Concentration
Leading Exporters		
Soviet Union	9.72	.60
United States	2.13	.24
France	1.23	.07
United Kingdom	1.11	.21
China-Mainland	2.04	.46
West Germany	.22	.16
Czechoslovakia	1.95	1.14
Poland	2.22	2.09
Israel	3.63	4.66
Italy	.25	.10
Leading Importers		
Saudi Arabia	.02	11.12
Iraq	.15	22.32
India	.05	9.23
Iran	0	9.78
United States	2.13	.24
Afghanistan	0	91.75
Cuba	.02	10.58
Vietnam	n.a.	n.a.
Syria	.09	19.58
Israel	3.63	4.66

Note:

$$\text{Relative export specialization} \equiv \frac{A_{EM}}{A_{ET}} \Big/ \frac{W_{EM}}{W_{ET}} = \frac{A_{EM}}{W_{EM}} \Big/ \frac{A_{ET}}{W_{ET}},$$

$$\text{Relative import concentration} \equiv \frac{A_{IM}}{A_{IT}} \Big/ \frac{W_{IM}}{W_{IT}} = \frac{A_{IM}}{W_{IM}} \Big/ \frac{A_{IT}}{W_{IT}},$$

where A = country A, B = country B, W = world, and the subscripts E, I, M, and T refer to the value of exports, imports, military goods, and total goods of all kinds, respectively.

n.a. = not available.

Source: U.S. Arms Control and Disarmament Agency (1991), Table II.

some services as well as goods, while an effort is made to exclude all services from these Commerce data.

Even though Commerce's merchandise export data exclude goods transferred to foreigners from the U.S. military abroad, those data, as well as Commerce data on imports, do provide a useful itemization of the kinds of military goods being traded, as shown in Table 6. From this itemization it is clear that military aircraft, along with engines and turbines for them, have constituted the largest dollar category of military goods exported from U.S. territory for many years. This is not surprising, in light of the U.S. comparative advantage in the aircraft industry. As indicated in the table, total military goods exports (as defined by Commerce) have comprised a fluctuating share of all U.S. merchandise exports, a share that has shown no readily discernible trend but has not exceeded 3.1 percent over the past eleven years.

On the other side of the ledger, total military imports have constituted an even smaller share of all U.S. merchandise imports. Imports of military aircraft and parts have been appreciable, however, in spite of U.S. competitive prowess in this industry. Thus, at least in this category, intra-industry trade has been noteworthy for the United States.

Which countries are the best customers of the United States for the military goods exports included in Table 6? Japan is number one, as indicated in Table 7. None of the countries listed accounts for a major share of these exports, which are widely distributed. By contrast, U.S. imports of military-type goods come predominantly from just two countries, the United Kingdom and Canada (Table 7).

A somewhat different picture of the geographic distribution of U.S. arms exports is obtained from the ACDA data, which include transfers from the U.S. military abroad and cover the period 1985–89 (Table 8). According to these more comprehensive data, Israel rather than Japan is the foremost recipient of

Table 6
U.S. Exports and Imports of Military-Type Goods, by End-Use Category, 1980–90
(In Millions of Dollars Unless Otherwise Specified; Census Basis)

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Merchandise Exports (f.a.s.)[a]											
Total	3,274	4,188	6,531	5,849	4,975	5,446	4,364	5,453	5,369	8,252	9,185
Military Aircraft—Complete	950	1,713	2,388	1,847	1,582	2,023	1,502	2,630	2,159	1,505	1,484
Military Launching Gear, Parachutes, etc.[b]										16	19
Engines and Turbines for Military Aircraft	94	114	173	226	170	182	149	200	278	856	841
Military Trucks, Armored Vehicles, etc.	137	157	376	267	199	202	125	128	149	799	674
Military Ships and Boats	15	9	344	307	15	30	22	19	20	14	15
Tanks, Artillery, Missiles, Rockets, Guns, and Ammunition	883	1,051	2,013	1,679	1,336	1,451	963	894	878	1,609	2,200
Military Apparel and Footwear	16	24	35	66	40	28	35	28	37	335	532
Parts; Special Category Goods Not Elsewhere Classified	1,180	1,118	1,203	1,460	1,634	1,530	1,568	1,555	1,849	3,118	3,422
Total as Percent of All U.S. Merchandise Exports	1.5	1.8	3.1	2.9	2.3	2.6	1.9	2.1	1.7	2.3	2.3
Merchandise Imports (Customs Value)											
Total	218	597	745	547	1,147	1,168	1,478	1,595	1,740	1,037	1,101
Military Aircraft and Parts	206	570	710	516	1,060	1,039	1,314	1,402	1,513	750	843
Other Military Equipment	13	27	36	31	87	129	164	193	227	288	258
Total as Percent of All U.S. Merchandise Imports	*	.2	.3	.2	.3	.3	.4	.4	.4	.2	.2

Note: Detail may not add to totals shown because of rounding.
[a]Excludes goods transferred to foreign residents by U.S. military abroad.
[b]Included in another category for years before 1989.
*Less than 0.1 percent.
Source: U.S. Department of Commerce: International Trade Administration, Compro Data Base for exports for 1980–88, and Bureau of Economic Analysis for remaining data.

Table 7
Leading Trading Partners of the United States in Military-Type Goods, Cumulative 1989–90 (Census Basis)

U.S. Military Exports (f.a.s.)[a]			U.S. Military Imports (Customs Value)		
Country of Destination	In Millions of Dollars	As Percent of Total Military Exports	Supplying Country	In Millions of Dollars	As Percent of Total Military Imports
Japan	1,991	11.4	United Kingdom	639	29.7
West Germany	1,265	7.3	Canada	484	22.5
United Kingdom	1,235	7.1	Israel	183	8.5
South Korea	1,212	7.0	Netherlands	136	6.3
Israel	1,015	5.8	West Germany	111	5.2
Canada	905	5.2	France	90	4.2
Taiwan	815	4.7	Singapore	79	3.7
Egypt	803	4.6	Spain	71	3.3
Spain	781	4.5	Belgium & Luxembourg	55	2.6
Netherlands	704	4.0	Italy	46	2.1
Australia	666	3.8	South Korea	35	1.6
Turkey	665	3.8	Sweden	34	1.6
France	569	3.3	Australia	34	1.6
Saudi Arabia	474	2.7	Japan	23	1.1
Singapore	360	2.1	Denmark	23	1.1

[a]Excludes goods transferred to foreign residents by U.S. military abroad.
Source: U.S. Bureau of Economic Analysis.

U.S. arms transfers. U.S. arms exports still appear to be widely dispersed, however.

Dynamics of the Arms Trade: Some Basic Questions

The arms trade is shaped by many forces, ranging from greed to altruistic concern for the threatened or oppressed. Any attempt to quantify the impacts of these diverse influences is almost certainly doomed, not only because of the difficulty in fully specifying cause-and-effect relationships but because of a sparsity of reliable data. In the circumstances, advanced statistical techniques such as regression analysis must yield to less elaborate approaches which offer no illusion of precision but which can still provide a basis for tentative inferences and can perhaps stimulate further research.

With these considerations in mind, we address several basic questions concerning the arms trade in this section. More specifically, what are the typical relationships, if any, between the size of a country's military market, or outlays, and its military exports and imports? Do countries with large military exports

Table 8
Leading Recipients of U.S. Arms Transfers, Cumulative 1985–89

	Amount Transferred	
Country	In Millions of Current Dollars	As Percent of Total U.S. Arms Transfers
Israel	6,100	10.1
Japan	5,300	8.8
Saudi Arabia	5,000	8.3
Australia	4,100	6.8
United Kingdom	3,200	5.3
Taiwan	3,000	5.0
Egypt	2,900	4.8
Spain	2,800	4.6
West Germany	2,600	4.3
South Korea	2,600	4.3
Turkey	2,500	4.1
Netherlands	2,200	3.6
Greece	1,800	3.0
Belgium	1,400	2.3
Italy	1,200	2.0

Source: U.S. Arms Control and Disarmament Agency (1991), Table III.

also tend to have large military imports? Have arms transfers to a country from the Warsaw Pact generally stimulated competitive transfers to the same country from the members of NATO, and conversely? As a country has imported more arms in relation to its GNP, has it usually become more dependent on one of the major competing military alliances?

First, consider the relationship between a nation's military outlays and its military exports. For sophisticated weapons, it is often reported that the cost of production per unit declines as output increases until the total value of production becomes relatively large. Because of such economies of large-scale production, nations with relatively limited demand for these weapons reportedly find it uneconomical to produce them in the absence of substantial export sales. Thus:

> European defense industries always have had more incentive to export than their American counterparts. The small size of European defense budgets as compared with that of the United States has encouraged exports as a means of reducing unit costs. European countries producing military aircraft exclusively for domestic use were likely to limit production to several hundred planes at most, whereas the United States air forces would frequently require 1,000 aircraft. While the difference in unit cost is relatively small if 2,000 planes are manufactured instead of 1,000, the unit cost difference is substantial if 1,000 aircraft are produced instead of 200. Thus, by spreading out production costs and recouping research and development expenditures, European defense companies and defense ministries benefit significantly. . . . The French claim that without export orders maintaining aircraft production at Dassault-Breguet would be impossible.[5]

No doubt economies of scale are substantial in certain arms industries and provide a strong incentive for export sales by those industries in countries with relatively small domestic purchases. But are such economies of scale important enough to determine the general relationship between a country's total military outlays and its military exports? More precisely, for the country with relatively small military expenditures—with a limited military market—are military exports larger in relation to military expenditures than for the country with an appreciably greater military market?

As can be seen in Figure 1, the answer seems to be negative. For the 124 countries that could be included for the years 1985 to 1989, the ratio of arms exports to military expenditures exhibits no general decline as military expenditures increase across countries. Because the transactions of the United States and the Soviet Union are a different order of magnitude from those of the other countries, the question arises whether the foregoing conclusion would be the same if those two huge transactors were excluded. Figure 2, which excludes them, does indeed support that conclusion. Thus, while economies of scale surely provide impetus for export sales by some industries in some countries, this impetus is not so strong as to dominate the overall relationship between arms exports and total military expenditures. Not only do the countries with the largest military markets boast the largest military exports, but their military exports usually are as large in relation to their markets as in the countries with small markets.

If arms exports tend to increase with military expenditures, is the same true of arms imports? Not according to the data presented in Figure 3. What is striking about this chart is not only the absence of any obvious relationship between military expenditures and arms imports, but also the marked aversion to imports on the part of both the Soviet Union and the United States. A number of other countries with much smaller military expenditures purchased about as much or more in foreign arms. This is further testimony to the relative self-sufficiency, approaching autarky, of these two dominant arms producers.

Arms imports seem generally unrelated to military expenditures.

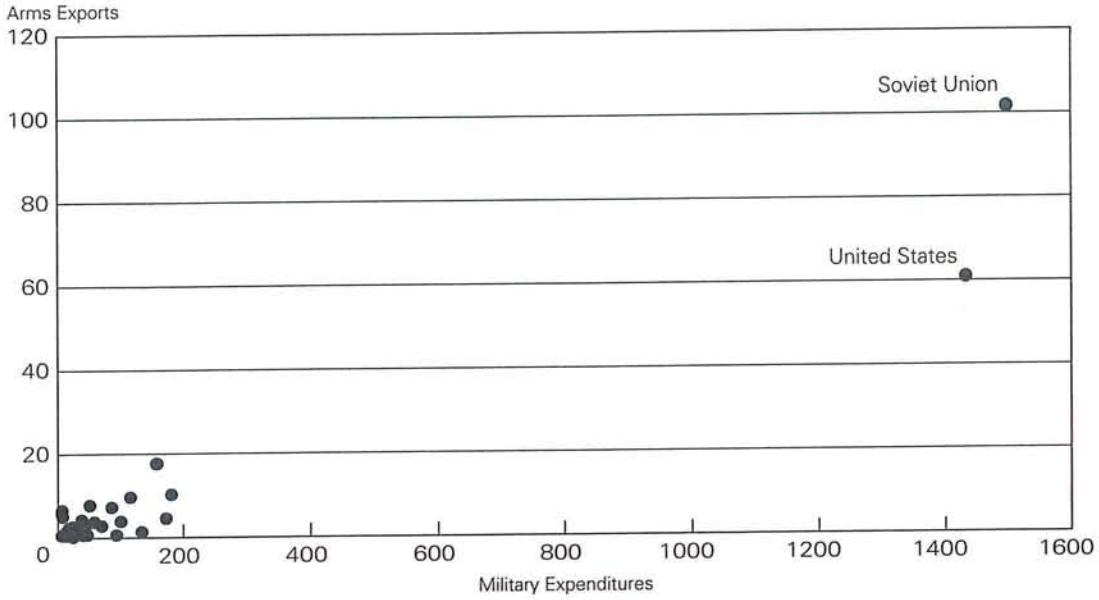
Even if the United States and the Soviet Union are excluded from the analysis, however, the conclusion holds that arms imports seem generally unrelated to military expenditures.

For many industries, it is common for a country to export some of the products of the industry while importing others. Such intra-industry trade is more likely if the various products of the industry are subject to economies of scale and if a variety of products is desired, as these factors encourage countries to specialize in and exchange different product lines. If intra-industry trade were pronounced for the

[5] Ferrari, Madrid, and Knopf (1988, p. 10); also see Snider (1987, pp. 41–43).

Figure 1

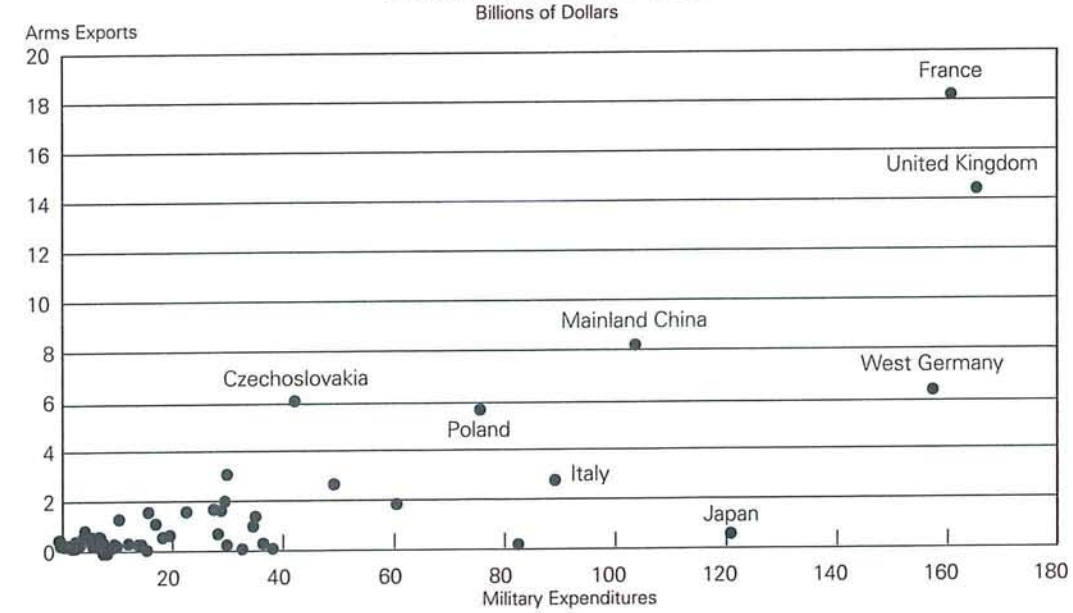
Countries' Military Expenditures and Arms Exports, Cumulative 1985 to 1989



Note: Included are only those countries, 124 in all, for which data were available for at least two years. The coefficient of correlation for the data plotted is 0.966.
Source: U.S. Arms Control and Disarmament Agency (1991), Tables I and II.

Figure 2

Countries' Military Expenditures and Arms Exports, excluding the United States and the Soviet Union, Cumulative 1985 to 1989

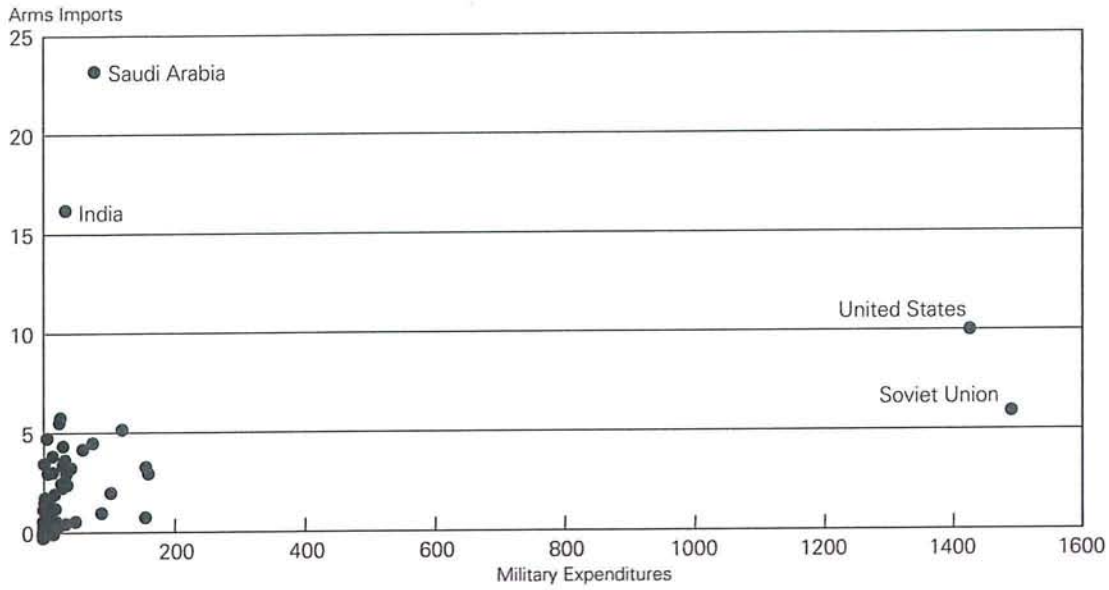


Note: Included are only those countries, 122 in all, for which data were available for at least two years. The coefficient of correlation for the data plotted is 0.831.
Source: U.S. Arms Control and Disarmament Agency (1991), Tables I and II.

Figure 3

Countries' Military Expenditures and Arms Imports, Cumulative 1985 to 1989

Billions of Dollars



Note: Included are only those countries, 124 in all, for which data were available for at least two years. The coefficient of correlation for the data plotted is 0.350.
Source: U.S. Arms Control and Disarmament Agency (1991), Tables I and II.

armaments industries, countries with sizable arms imports would also deliver sizable arms exports.

The arms trade seemingly marches to a different drummer. As already noted, the imports of the United States and the Soviet Union are dwarfed by their arms exports. Nor do arms imports and exports exhibit much correspondence in other countries (Figure 4). In fact, of the 142 countries for which 1985–89 data were available, 78 were importers with no reported exports. Consequently, while intra-industry trade in armaments does occur, it is hardly a salient feature.

If the arms trade differs in key respects from much other trade, many observers would argue that international power politics are largely responsible. For example, governments commonly seek to block arms exports from their countries to hostile countries. On the other hand, they may promote arms exports to countries with which they seek to gain influence. Such influence-seeking could inspire fierce competition in the arms trade, with opposing governments pushing their military wares in an effort to recruit to their camps those countries that were relatively neutral and strategically important (Ferrari, Madrid, and Knopf 1988, p. 84).

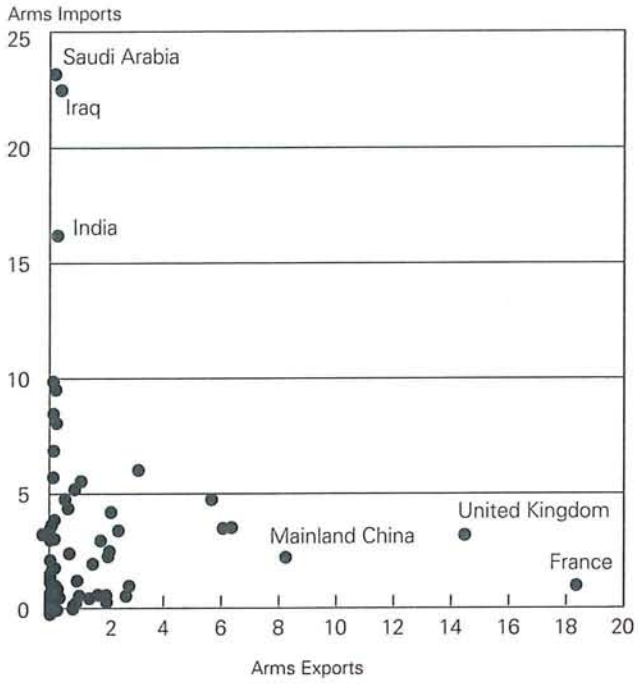
If this kind of competition had raged between NATO and the Warsaw Pact in recent years, one might expect to find that a number of countries had received significant arms transfers from both alliances, neither of which had captured the markets in the recipient countries. But as indicated in Figure 5, such recipients are rare. The chart includes countries that received arms shipments from the major suppliers within NATO or the Warsaw Pact during the years 1985 to 1989, but excludes the member countries of those alliances. If arms transfers to a country by one of the alliances had normally evoked competitive transfers to the same country by the other alliance, the points plotted would form a pattern sloping upward and to the right. The picture is quite different, however. In their arms dealing with these two alliances, most countries seem to have been overwhelmingly committed to one or the other. By and large, arms transfers from one of the alliances preempted the market of the recipient.[6]

Of course, political considerations have contrib-

Figure 4

Countries' Arms Imports and Exports, excluding the United States and Soviet Union, Cumulative 1985 to 1989

Billions of Dollars



Note: 142 countries are included. The coefficient of correlation for the data plotted is 0.078.
Source: U.S. Arms Control and Disarmament Agency (1991), Table II.

uted heavily to this outcome. For example, the U.S. government would hesitate to approve the sale of advanced equipment to a country that was acquiring substantial armament from the Soviet Union, for fear that the technology might fall into Soviet hands. But economic factors have also played a role. For many weapons, it may not be feasible to simultaneously utilize competing varieties from different suppliers, especially when specialized training is required to operate the weapons.[7] And having selected a particular weapon, the recipient may be able to procure replacement parts only from the original supplier; one analysis reports that since 1964 spare parts and support services, including training and construction, have accounted for a much larger share of U.S. arms transfer agreements than have weapons and ammunition (Louscher and Salomone 1987, p. 24).

Efforts to Control the Trade[8]

The Gulf War and revelations about prewar arms sales to Iraq have provoked recommendations for tighter restrictions over the flow of arms to the Third World. The underlying concern has been heightened by two predictions: that the impressive performance of U.S. weapons in the Gulf War would enhance Third World demand for such advanced arms; and that industrial country suppliers would readily accommodate the new demand, seizing the opportunity to make up for decreasing sales to their own governments brought about by the easing of the Cold War.

[6] Caveat: Not all the relevant arms transfers are captured by the ACDA data. For example, it is well known that significant quantities of U.S. arms were conveyed into Nicaragua. ACDA reports that its data "represent arms transfers to governments and do not include the value of arms obtained by subnational groups" (U.S. Arms Control and Disarmament Agency 1990, p. 137).

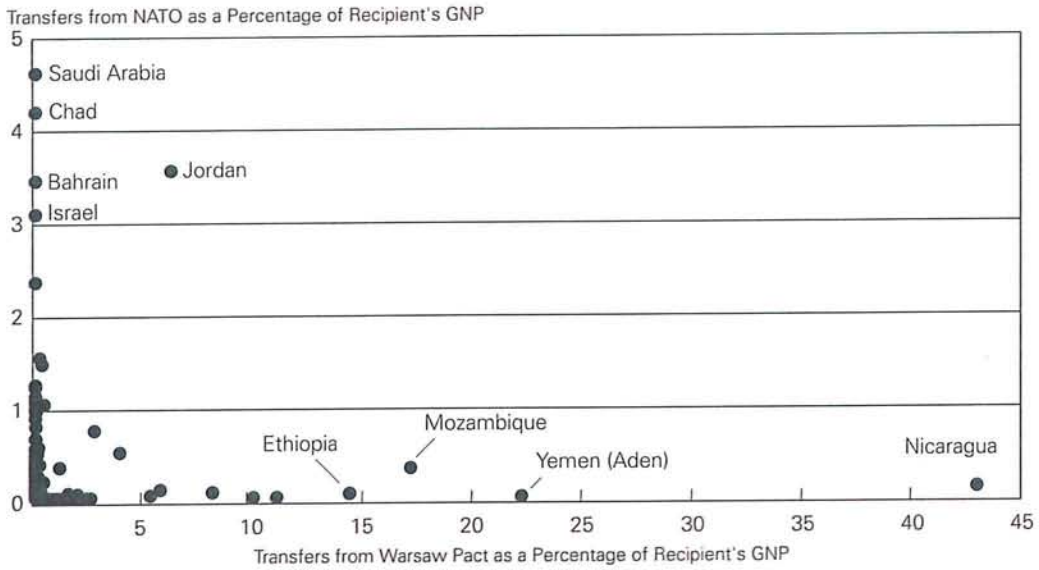
[7] "Mixing arms from several countries can result in noncomplementary systems that could degrade the military effectiveness of the weapons on hand," according to Ferrari, Madrid, and Knopf (1988, p. 86).

[8] This section is based largely on the following sources: National Academies of Sciences and Engineering and Institute of Medicine (1991); U.S. Congress, House of Representatives, Committee on Government Operations (1991); and U.S. Department of State (1990).

Figure 5

Arms Transfers from NATO and the Warsaw Pact, as a Percentage of Recipient's GNP, Cumulative 1985 to 1989

Billions of Dollars



Note: 105 countries are included. Member countries of NATO and the Warsaw Pact are excluded. NATO here is France, West Germany, the United Kingdom, the United States, and Other Europe as defined in U.S. Arms Control and Disarmament Agency (1991), Table III.
The coefficient of correlation for the data plotted is -0.089.
Source: U.S. Arms Control and Disarmament Agency (1991), Tables I and III.

Restrictions are not new to the arms trade. Perhaps the best known of the current controls are those under the aegis of the Coordinating Committee for Multilateral Export Controls (CoCom), which was formed in 1949 as an informal forum associated with NATO. The purpose of CoCom, which came to include Australia and Japan as well as NATO members (excluding Iceland), has been to prevent or delay the Soviet bloc and communist China from acquiring goods and technology that would enhance their military prowess. To this end, CoCom has sought the cooperation of third countries in enforcing its export controls.

CoCom has maintained three lists of items to be controlled: (1) an International Munitions List, including goods and technologies with purely military applications; (2) an International Atomic Energy List, including goods and technologies with nuclear applications; and (3) an International Industrial List of goods and technologies with commercial as well as military applications (also known as the "dual-use" list). Placement of an item on a list does not necessarily prohibit its export to the targeted countries but does indicate that a proposed export is to be reviewed and approved in advance by CoCom members, except for certain specified, less sensitive items that may be exported subject only to subsequent notification to CoCom. All decisions by CoCom, including formulation of the lists, are by consensus, meaning that any member can exercise a veto.

In addition to CoCom, several other regimes have been established to prevent the proliferation of particular weapons and weapons technology. The targeted items are nuclear weapons, chemical weapons, and missile technology.

Under the Nuclear Non-Proliferation Treaty launched in 1968, participating nations possessing nuclear weapons pledge to work toward nuclear disarmament and to share peaceful nuclear technology with signatory nations lacking such technology. In return, the nations receiving the peaceful technology pledge not to acquire nuclear weapons. In addition, groups of countries have committed themselves to refrain from exporting certain nuclear materials or

technology to "non-weapon" states without obtaining safeguards to assure peaceful use.

In order to impede the proliferation of chemical weapons, the "Australia Group" was formed in 1984. Chaired by Australia, this group of 20 nations identifies chemicals important to the development of chemical weapons, recommends appropriate controls over the export of these "precursor" chemicals, and shares information on the efforts of countries to acquire them.

Finally, the Missile Technology Control Regime was created in 1987 to restrict the export of goods and technology useful for producing missiles capable of carrying nuclear payloads. To this end, the 14 member nations have promulgated a set of export guidelines that each country executes in accordance with its national legislation (without seeking group approval).

It is clear from these efforts that the threat of proliferation has sparked preventive measures, but several analyses have argued that relatively more of the arms control effort should be directed toward this threat and relatively less toward the presumably diminishing threat posed by communism. In fact, some progress in this direction has been made. With respect to the communist threat, for example, during the past year and a half CoCom has sharply reduced the number of dual use items to be controlled (Greenhouse 1991; Browning and Lachica 1991). With respect to proliferation, on the other hand, last July the United States, the Soviet Union, China, France, and the United Kingdom espoused the goal of eliminating all weapons of mass destruction from the Middle East. Accordingly, these five major arms suppliers agreed to develop "stringent national and, as far as possible, harmonized controls" on transfers to the region of nuclear, chemical, and biological weapons or technology for such weapons. Moreover, they pledged to observe "rules of restraint" in conventional weapons transfers to the region (Riding 1991).

The United States not only participates in all of the foregoing multilateral export control schemes but also maintains additional restrictions over selected exports of military significance. For example, the nation requires that each supercomputer export be individually authorized, or licensed, regardless of destination. And proposed exports of equipment used to manufacture armaments are reviewed to forestall shipments that would contribute to destabilization of the country or region of destination.

Of course, these controls are not watertight. Precise information is not available on the degree to which the controls are circumvented, but the data in Table 9 may serve as crude indicators of the year-to-year fluctuations in illegal arms shipments from the United States. While the number of seizures by U.S. Customs officials was no higher in 1989 and 1990 than in 1983 and 1984, the value of items seized was substantially greater, even allowing for increases in prices.[9] Thus, the volume of illegal trade may have grown appreciably in recent years.

Although they do not advocate illegal shipments, a number of analysts have argued that U.S. arms controls are unduly restrictive—and that they unjustifiably handicap U.S. manufacturers in meeting foreign competition, in light of the less restrictive controls maintained by other countries. A major study published this year by the National Academy of Sciences concluded that the negative impact of export controls on the U.S. economy has stemmed overwhelmingly from measures taken by the United States that are not duplicated by other countries participating in the control regimes. Among these

Table 9
Seizures by U.S. Customs Officials of Illegal Export Shipments of Items Having Military Applications, 1982–90

Fiscal Year	Number of Seizures	Value of Items Seized (Millions of Dollars)
1982	765	56
1983	1,444	86
1984	1,459	86
1985	750	75
1986	802	52
1987	1,044	76
1988	723	82
1989	1,424	105
1990	1,348	132

Note: For an item to be seized, the export license documentation must be deemed invalid or deficient, and a violation of export control regulations must be presumed.
Source: U.S. Customs Service.

[9] Which of the available indexes to use in adjusting for price changes for arms is debatable. One plausible choice would be the producer price index for manufactures, which rose by 17 percent from 1983 to 1990, compared to an increase of 53 percent in the value of seizures.

damaging unilateral U.S. measures, the study listed the following (p. 19):

> controls on reexports of U.S. items to third countries and the requirement for written assurances regarding end use and reexport;
> controls on U.S.-owned foreign entities;
> controls on foreign products that use (or are made with) technologies of U.S. origin;
> controls on foreign products that have U.S.-origin components in them;
> control of some dual use items as munitions that other CoCom nations regulate less restrictively as dual use products;
> selective imposition of unilateral product and technology controls;
> more burdensome and complex licensing regimes; and
> more stringent enforcement mechanisms.

Except in rare cases where the United States is the sole supplier of an item, such unilateral measures fail to prevent the proscribed countries from acquiring the item from a non-U.S. source. Even more harmful to U.S. industry has been a loss of sales to *nonproscribed* countries where prospective purchasers have been concerned that their business operations might be complicated or disrupted by the intrusion of unilateral U.S. measures such as those listed above. In particular, the U.S. policy of formally requiring foreigners to secure its permission for the reexport of U.S. goods or technology from foreign territory is without parallel among U.S. allies.

Criticism of U.S. controls has not been limited to their unilateral content. In addition, administration of the controls is widely perceived to be extremely inefficient. More than a dozen government agencies, with differing missions, differing constituencies, and differing statutes to interpret, are involved in the licensing of exports, generating confusion and interagency disputes over where responsibility lies and what type of license is required. Again, one likely result is that U.S. firms forfeit sales to foreign competitors, whose governments generally process license applications more quickly. To remedy this inefficiency, a congressional committee has recommended, among other things, that an agency be created with sole authority for the issuance of all export licenses, that all authority to impose and maintain export controls be combined in a single statute, and that all authority to enforce export controls over dual-use goods be consolidated in the Customs Service (U.S. Congress, House of Representatives, Committee on Government Operations, 1991, pp. 50–53).

Throttling Back on Arms Exports: The Economic Impact

As the foregoing discussion indicates, considerable objection has been raised to U.S. arms control measures that succeed only in transferring business from U.S. firms to their foreign competitors. To be sure, lost sales can mean lost profits and lost wages. This line of reasoning is enlisted by the State and Defense Departments to help justify substantial federal financing of U.S. arms sales. In their joint *Congressional Presentation for Security Assistance Programs: Fiscal Year 1992*, which proposed federal financing of about $4¾ billion, these agencies argued as follows (p. 6):

> Security assistance is not a philanthropic effort, but one which produces direct domestic benefits. These assistance and sales programs have a positive net impact upon our domestic economy. For example, that part of the production of U.S. defense industry which is composed of arms sales abroad provides jobs for American workers and increases exports to help the U.S. balance of trade. In addition, these sales provide economies of scale (e.g., longer production runs) which reduce the cost of weapons systems of continued interest to the U.S. Armed Forces.

No doubt an abrupt cessation of U.S. arms transfers could beget, in the very short run, a corresponding reduction in total U.S. exports and output. The longer-run consequences for U.S. exports, output, and employment would be less severe than the initial reduction in U.S. exports would suggest, however, and might even be positive. The ultimate net impact would depend on a number of factors, some imponderable. To illustrate, the initial worsening of the U.S. balance of trade probably would induce some depreciation of the dollar's foreign-exchange value, which would help to reverse the drop in exports and output. Moreover, if the federal government were to spend domestically the funds that it had previously been granting to foreign governments to finance their acquisitions of U.S. arms, the result, again, would be to bolster U.S. output. Also, if the Federal Reserve were striving to attain a certain level of nominal GNP, it would ease monetary conditions in reaction to the initial decrease in exports and output, another response that would tend to restore the preexisting level of output.

Even though the long-run net impact of a reduction in arms sales would differ substantially from the immediate impact, the immediate impact is still of

Table 10
Estimated U.S. Employment Related to Exports of Military-Type Goods in Table 6, for the Year 1990

Industry	Description	1990 Employment (Thousands)
Manufacturing Sector:		
SIC Code		
28	Chemicals and Allied Products	.2
34	Fabricated Metal Products	22.8
35	Machinery, Except Electrical	4.5
36	Electric and Electronic Equipment	3.4
37	Transportation Equipment	34.0
38	Instruments and Related Products	7.1
	Total	72.0
Nonmanufacturing Sector[a]		70.0
Total Employment		142.1

Note: Detail may not add to totals because of rounding.

[a]Ratio of total U.S. export-related employment in manufacturing to nonmanufacturing multiplied by total manufacturing employment related to military-type goods exports, or 2,258/2,318 × 72. See U.S. Bureau of the Census, *Exports from Manufacturing Establishments: 1985 and 1986* (Washington, D.C.: 1989), Table 1.

Source: Appendix; and U.S. Bureau of the Census, *op. cit.*, Tables 1 and 4a.

interest as an indicator of the magnitude of adjustment facing the economy. Suppose, for example, that none of the arms exports in 1990 detailed in Table 6 had been permitted. How many would have become unemployed if everyone involved in producing these exports had been laid off? The answer, according to Table 10, is about 142,000—or 0.1 percent of the total labor force. Something like this number may have been employed in producing the exports of military-type goods reported for 1990 in Table 6. The bulk of the manufacturing employment was in industries turning out transportation equipment and fabricated metal products.

To interpret these figures correctly, one must have at least a rough understanding of how they were derived. The Census Bureau publishes data from which it is possible to estimate the employment related to manufactured exports, with employment defined to include workers who manufacture components that become incorporated in the products to be exported. Because these Census data are presented for 1986, we evaluated the military goods exports reported for 1990 (in Table 6) at 1986 rather than 1990 prices. Using a series of relationships computed from the aforementioned Census publication, we then translated these export data into plant shipments and employment. A fuller account of the methodology is set forth in the Appendix Table and the footnote to Table 10.

This procedure makes no allowance for any productivity gains between 1986 and 1990 and, on this count, may somewhat overstate the employment related to military goods exports for 1990 as reported in Table 6. Even so, the estimated employment is a tiny fraction of the total labor force. If the size of that fraction is any guide, the nation should suffer little economic trauma from a cutback in arms exports, although particular localities might be significantly affected.

This kind of analysis cannot readily be extended to other arms-exporting countries, because the necessary data are lacking. Some general observations on spending for military purposes can be offered, however.

From 1972 through 1988 military expenditures consumed about 5 percent of the world's output each year. For less developed countries the share was closer to 5½ percent, and in some of these countries relatively large military expenditures undermined economic growth by diverting resources from meritorious projects (Hewitt 1991b, pp. iv, 1–5). Thus, it is not surprising that some substantial aid donors, including Germany, Japan, the International Monetary Fund, and the World Bank, reportedly are curtailing their assistance to countries whose military expenditures they consider excessive (Kinzer 1991; "Japan to Link Aid to Arms Trade" 1991; Sampson 1991). That such policies should have some success in limiting military spending is implied by a recent study that finds such spending to be sensitive to the level of concessional financing a country receives (Hewitt 1991a).

Of course, economic hardship will not put an end to military spending. For one thing, as Adam Smith said long ago, "defence . . . is of much more importance than opulence. . . ."[10] But some military expenditures are not so much for defense against foreign threats as for maintaining dictatorial regimes. Insofar as military spending is for external defense, the pity is that more nations do not negotiate mutual reductions that would allow them all to be better off.

[10] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (New York: Random House, 1937), p. 431.

Summary and Conclusion

The war in the Persian Gulf focused more attention on the international trade in armaments, with some analysts forecasting a substantial increase. At least 120 countries participate in this trade, which accounts for about 1½ percent of total international trade. In recent years two-thirds of all arms exports have come from the Soviet Union and the United States, which have ranked first and second, respectively, among the world's suppliers. However, the overall exports of the Soviet Union have been concentrated much more heavily in arms than have the exports of the United States or other major arms suppliers. For the United States, military aircraft, along with engines and turbines for them, have been the largest dollar category of military exports for many years.

In spite of Soviet and U.S. preeminence among arms exporters, arms sales have been less important to the economies of these two countries than to some others, especially Israel's and North Korea's. But prosperity is not associated with a high ratio of arms exports to economic output. Nor does poverty bar the acquisition of arms; the nations that spend the largest shares of their income on arms imports are mostly among the world's poorest.

An inquiry into the dynamics of the arms trade yields several tentative conclusions. Economies of large-scale production are not important enough to determine the overall relationship between a country's military expenditures and its arms exports. In addition, while arms exports tend to rise with military expenditures from country to country, no such relationship is readily discernible between military expenditures and arms imports, nor is intra-industry trade in arms a salient feature. Finally, the competition for influence between NATO and the Warsaw Pact in recent years seldom resulted in significant arms transfers from both alliances to the same country. In their arms dealings with these two alliances, most nonmember nations seem to have been overwhelmingly committed to one or the other.

A number of multilateral efforts have been undertaken to control the arms trade. In addition to participating in these efforts, the United States maintains other restrictions over selected exports of military significance. Because U.S. control measures have generally been more stringent than those in other exporting countries and could have been administered more efficiently, arms sales by U.S. firms have been rather pointlessly forfeited to competing foreign sellers. On the other hand, a drastic reduction in authorized U.S. arms exports would not have a dramatic impact on the U.S. economy, especially in the long run, although particular localities might well suffer.

Appendix

Derivation of Estimated Export-Related Manufacturing Employment Related to Exports of Military-Type Goods in Table 6, for the Year 1990

Standard Industrial Classification		1990 Exports		Estimated Direct Export Shipments f.o.b. Plant[c]	Estimated Total Export-Related Shipments[d]	Estimated Export-Related Employment (Thousands)[e]
Code	Description	At 1990 Prices[a]	At 1986 Prices[b]			
28	Chemicals and Allied Products	41	34	29	48	.2
34	Fabricated Metal Products	814	699	626	2,153	22.8
35	Machinery, except Electrical	469	440	386	565	4.5
36	Electric and Electronic Equipment	167	153	134	310	3.4
37	Transportation Equipment	6,913	6,203	5,470	6,480	34.0
38	Instruments and Related Products	781	664	578	691	7.1
	Total	9,185	8,193	7,224	10,247	72.0

Note: Exports in millions of dollars.

[a]Allocation by SIC based on approximate data supplied by U.S. Bureau of Economic Analysis.

[b]Deflated by SIC-based price indexes from U.S. Bureau of Labor Statistics, using annual averages.

[c]Based on application of f.o.b. adjustment factors by SIC, from U.S. Bureau of Census, *Exports from Manufacturing Establishments: 1985 and 1986* (Washington, D.C.: 1989), Appendix B.

[d]Based on ratios of total export-related shipments to direct export shipments, by SIC, derived from U.S. Bureau of Census (1989), Table 4A.

[e]Based on ratios of total export-related manufacturing employment to total export-related shipments, by SIC, derived from U.S. Bureau of Census (1989), Table 4A.

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