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An examination of trade practices indicates that European discriminatory practices have had a slightly greater effect on U.S. trade than vice versa, and that government procurement practices in Europe will increasingly bias trade against the United States if past trends continue. This paper discusses the barriers and market distortions that restrict free trade of defense goods between allies and offers suggestions to improve the flow of defense goods within an alliance.

DISTORTIONS IN NATO DEFENSE TRADE

by

Major William C. Foster, U.S. Army

Introduction. Estimates of military and economic efficiency gains have served as a catalyst to a general consensus on both sides of the Atlantic that rationalization, standardization and interoperability (RSI) is more than a worthwhile goal—it is a necessity.¹ A consensus has not been reached, however, on the appropriate paths to that goal. Many Europeans see standardization as leading to greater dependence on the United States for technologically advanced weapons systems. Oft-voiced concerns in the United States range from fears that efforts to improve the two-way street will lead to substantial qualitative and economic costs to the concern of industry that its market share and capabilities may decline, especially in light of suspected massive European support of its own armaments industry. This latter concern is illustrated by the testimony of the former President of Boeing, Oliver C. Boileau, when he stated to Congress "we cannot

compete when a U.S. company/consortium faces . . . [a] foreign company/consortium which is supported or subsidized by the home government."² Thus, despite the rhetoric that RSI is a military and economic necessity, the implementation of RSI has moved little from the point where, in Thomas Callaghan's words, the allies remain:³

—blocked from sharing the financial burdens of weapons development, production and support;

—blocked from sharing research and development costs of new energy sources and new methods of using energy more efficiently;

—blocked from buying and selling to the other the goods that each produces more efficiently;

—blocked from providing jobs and markets for their industries on an international scale.

This essay examines the barriers and market distortions that restrict free trade of defense goods between the

NATO allies and that, therefore, remain the primary stumbling blocks to increased rationalization and standardization through a common defense market. The primary focus will be on the United States, the United Kingdom, West Germany and France as they constitute, as a group, over 80 percent of NATO defense production, procurement, and exports.

Theory. The argument that removal of trade-distorting measures will lead to both equipment standardization and economic gain is based on the classical theory of international trade. This theory offers as proof the so-called law of comparative advantage that states that trade should be based on relative efficiency of production. Each nation should specialize in producing that good in which its opportunity cost in production is less than its trading partner's and should trade that good for the good in which it has a comparative disadvantage. As an absolute advantage is inconsequential, trade following the law of comparative advantage will leave both nations better off in terms of goods available. In the area of defense goods, standardization would logically result because procurement of a given item would be from the nation that has a comparative advantage. Therefore, economic gain would be realized as more defense output would occur for the use of the same quantity of alliance resources. The classical model is, however, often criticized on the grounds that the underlying assumptions are unrealistic, the model lacks dynamic application, and the model fails to consider necessary external adjustments. Based on these criticisms, arguments are made that overall welfare is improved by government intervention to alter trade flows. Specifically, in the area of defense goods, criticisms are levied that the model fails to consider consequences that comparative advantage has on employment, balance of payments,

external technological spinoffs, increasing returns to scale in defense industries, the surge capacity necessary in wartime, and the threat of embargo. Each of these criticisms has been the source of support for specific programs of government assistance and the introduction of barriers in the production and trade of defense industry output. These arguments will be examined to determine their validity, whether distorting defense trade is appropriate if the argument is valid, and what sort of distortion is optimal if distortion to trade is, in economic terms, superior to free trade.

Employment. Rigorous trade theory shows that specialization increases the returns to the input factor employed more intensively in the production of a given output and decreases the returns to the less intensively employed factor. Therefore, capital-intensive countries that specialize in their comparative advantage can expect either increased unemployment or a lower wage rate.⁴ This, however, does not validate government interference in the free trade of defense goods as an appropriate or optimal means of achieving employment goals. Defense industries are by nature relatively capital-intensive and, therefore, attempts to specialize in defense goods will have an adverse effect on employment. Attempting to attack unemployment, a society-wide problem, on a narrow sectoral basis is inappropriate. The appropriate policy is generally considered to be a general subsidy to labor employment. Although in the short run there may be some real labor dislocation and adjustment costs associated with a loss of competitiveness in defense industries, distortion of defense trade solely for macroeconomic employment purposes is not economically valid as employment goals can be met more efficiently by other means.

Balance of Payments. Attempting to argue that defense goods must be

protected for balance-of-payments reasons is equally vacuous. While it may look inviting on the surface to say that buying at home prevents imports and improves the balance of trade, it is only a partial analysis of the situation and fails to consider the feedback effects of such a policy. Feedbacks are felt in primarily three areas. First, the increased purchases at home increase domestic income and, therefore, imports. Second, the purchases at home put upward pressure on the price of domestic resources, forcing domestic producers using similar resources to search overseas for cheaper materials. Finally, in an era of flexible exchange rates, the initial improvement in the trade balance puts upward pressure on the currency, thus encouraging domestic buyers to purchase what are now relatively cheaper foreign products and discouraging purchases by foreign buyers because of the higher foreign exchange price of domestic goods.

Technology Spinoffs. The concern is often voiced that rationalized defense goods production will lead to the production and export by the United States of technologically sophisticated goods while Europe is reduced to "metal bashing." This concern is coupled with a fear that defense technology leads to commercial spinoffs and, therefore, rationalization of defense industry would be a forerunner of European technological dependence on the United States. This is basically a criticism that the law of comparative advantage ignores externalities. Whether the criticism is valid in this case is, however, inconsequential because protection of defense industries would not be an appropriate strategy if technological parity is a policy goal. Such a goal is better met by a direct subsidy to technology—for example, increased government-funded research and development—rather than protection for one output sector that is dependent upon

the technology. Again, the concern may be valid, but the policy prescription of defense industry aid and protection is not an optimal policy for addressing the concern.

Production Economies. Another common criticism of the law of comparative advantage is that it is a static analysis and, consequently, fails to adjust for changing production capabilities. In defense industries the argument is founded on the idea that the United States has lower relative costs owing primarily to learning experience and higher production rates. Thus, if Europe were given a chance to develop large-scale defense industries, it could compete effectively with the United States in many areas with gains accruing on both sides of the Atlantic. This form of the economically valid "infant industry" argument would argue that protection is appropriate until scale economies are gained. The practical problem lies, of course, in how long should the protection be tolerated. Clearly, it becomes politically difficult to remove protection once in place. Recently an economic argument has been advanced that governments faced with a potential embargo should protect defense industries exhibiting learning curve returns even if eventual comparative advantage is not possible.⁵ This lends additional credence to protectionist arguments.

Mobilization Base. That outbreaks of hostilities have traditionally led to price controls and rationing is sufficient evidence for many that protection of defense industries to ensure necessary surge capacity is appropriate. This is, again, a criticism of the static nature of the classical trade model. The argument is based on the assumption that consumers are poor intertemporal optimizers, as they assume that today's opportunity costs will not change. It is, therefore, the responsibility of government to subsidize specific sectors that

must have surge potential. And again, the optimal policy is a subsidy to specific sectors. Recent theoretical and empirical work in this area indicates that the sectors appropriate for a subsidy are limited and that any subsidy should be directed toward increasing input capital as opposed to present output if surge capacity alone is the goal.⁶

*Embargo.*¹ The opportunity cost of comparative advantage is autarky. Thus the criticism is that the law of comparative advantage assumes free, uninterrupted trade and fails to consider the threat of embargo. Defense goods, it is argued, are prime candidates for embargo and, therefore, protection of domestic industry is justified and appropriate. This argument is valid from an economic point of view if one considers that the government can optimize intertemporally better than the public can. This would occur if, for example, the government has access to better information on embargo threats or is a better prognosticator than the public. Again, a subsidy is the optimal policy. The subsidy would be designed to alter output potential today so that subsequent economic adjustment would be minimized. The subsidy level would be determined by the extent of embargo that could be imposed given technological capabilities, the industrial base, and defense output.⁷

In summary, economic theory does offer, in specific instances, justification for government interference in the free flow of defense goods. In all cases, however, the government involvement must be addressed to "correct" what is seen as an already distorted market. The optimal policy is always a subsidy as opposed to any other government tariff or nontariff distortion to trade. The subsidy must always be directed as specifically as possible toward neutralizing the existing distortion.

Key Distortions to Military Goods Trade. Having established that government protection of defense industries is, in limited circumstances, economically justified, an examination of how national governments protect defense industries and whether those protective efforts have the desired effect is in order. Government protection policies that bear directly on defense industries can be divided into two main areas—government procurement practices and subsidies. Government procurement protection for domestic industries takes the form of either mandated price favoritism or more subtle general favoritism through such measures as bidding procedures and technical specifications. Subsidies must be either industry- or firm-specific to have a trade-distorting effect, as exchange rate changes will neutralize the trade influence of a general subsidy. Trade distorting subsidies can be either direct or indirect. Direct subsidies are straight cash outlays from the government to industries. Indirect subsidies are less obvious and cover the gamut from government guaranteed low interest rate loans to tax incentives. Government procurement can, in fact, be considered a form of indirect subsidy, but because of its critical nature in distorting defense trade and protecting defense industries it will be considered independently.

Discriminatory government procurement practices are commonly referred to as "Buy National" policies. The most explicit form of a "Buy National" policy is the price favoritism policy of the United States. Although now a waiver may be granted in the interest of standardization, the basic "Buy America" policy has, since 1962, advised the Secretary of Defense to purchase goods from domestic sources unless the foreign price plus 50 percent is less than the domestic price.⁸ This is a clear impediment to free trade as U.S. producers are, in essence, guaranteed preferential access to and dominance of the large

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domestic arms market. European countries, on the other hand, tend to practice general favoritism for domestic producers as opposed to the explicit price favoritism policy of the United States. One of the prime methods used to discriminate against foreign competition is to open bids for government business to domestic producers only, thus precluding foreign competitors at any price. General favoritism, while more subtle, can be just as effective in distorting defense trade and more difficult to detect and eliminate.

The basic method used to measure the quantitative effect of government procurement practices on imports is to compare government imports in various commodity classes with like imports by the civilian sector. The assumption is made that, in the absence of discriminatory procurement practices, the government would have the same propensity to import as the civilian sector. From this assumption one can determine a hypothetical value of imports in the absence of discrimination and, by dividing this hypothetical value by actual imports, develop a ratio known as an "index of discrimination" that can be applied to actual imports in any year to determine the results of government procurement practices.^{9 10} This method should compute all effects on trade of government procurement practices. While it would appear that there is a bias against the United States in this method of calculation, the results do indicate the directions in which trade is shifted by government procurement policies.¹¹

Several studies have been done to estimate the index of discrimination that results from the Buy America policy.¹² Although different data bases have been used and slightly different methodologies employed, the index of discrimination remained around 476 percent between 1958 and 1967. Table I shows that both defense imports as a percent of total imports and as a

percentage of military expenditures have in general declined since 1967. It is, therefore, very unlikely that the index of discrimination has declined. Table IIa shows the effect that the Buy America policy would have had on trade between 1973 and 1977 assuming a constant index of discrimination. Based on these calculations, unilateral elimination of the price favoritism policy of the United States would have shifted the defense merchandise trade advantage of the United States from its near ten to one bias to a more palatable, from the European view, two or three to one range. Table IIb shows the effect the policy will have between 1981 and 1985, assuming conditions do not change from the 1973-1977 period.

Similar efforts have been made to measure the index of discrimination for Great Britain, France, and West Germany.¹³ The studies show that during the 1960s the index of discrimination for these key European countries was declining. The primary reason for the decline in the index of discrimination is given as the growing solidarity of the EEC. Examination of Table I shows, however, that data available at the time of the original survey may have been unrepresentative of the trend or, at least, be inconsistent with today's situation. For example, whereas Great Britain's index of discrimination was 514 percent in 1965, it was only 150 percent in 1968. Table I shows, however, that 1968 was an unusual year for imports, both as a percentage of total imports and military expenditures. The data for 1973-1977 are more consistent with the former index than the latter. France consistently showed an index of discrimination around 122 percent until 1965. Table I however, shows, that since 1965 France, with its independent approach to national defense, has altered its approach to defense imports. Recent qualitative estimates indicate that France has an index of discrimination similar to that of the United

States.¹⁴ Germany's index of discrimination in 1965 was 28 percent. This would indicate that at that time Germany was biasing its government purchases toward imports, perhaps as a means of offsetting the cost of U.S. and other forces stationed in Germany. Table I indicates that although defense imports as a percentage of total imports have declined, defense imports have not declined as a percentage of military expenditure. This would lead one to believe that Germany's policy has not changed enough to suspect positive discrimination. Table IIIa shows the influence that consistent government procurement practices would have had on trade between 1973 and 1977. It shows that European discrimination, based on the model's assumption, has a slightly greater effect on the United States' trade than vice versa. Table IIIb shows the projected results for 1981 to 1985, assuming similar conditions to those of 1973-1977. This table, when compared to Table IIb, shows that government procurement practices in Europe will increasingly bias trade against the United States if past trends continue.

Clearly, there is a cost to national defense budgets of discriminating against cheaper foreign imports. In an examination of the costs to the Defense Department, the Bureau of the Budget determined that in 1963 the cost of the Buy America policy was 27 percent of the procurement diverted.¹⁵ These results were determined by making a line-by-line comparison of the lower foreign bids with the higher, but accepted, domestic bids. As the Buy America policy appeared to change little after 1963 (it may have been tightened), a rough approximation of the budgetary cost for the 1973-1977 period is estimated to be \$660 million. If similar policies were to continue during 1981 to 1985, the estimated budgetary cost would be \$1.26 billion. This would be somewhere between one-half percent and one percent of total equipment

expenditures. Although no comparable studies of European budgets are available, the similarity in discrimination patterns in Great Britain and France would lead one to the same general conclusion.

The Buy America policy was initially justified as a means of correcting the deficit in the balance of trade. Whether this occurs is questionable. In a study of the macroeconomic consequences of the Buy America policy, J. David Richardson determined that in the short run, total imports in defense industry commodity classes are only reduced by about 0.93 percent and in the long run by 1.34 percent compared to their expected levels in the absence of discrimination. Furthermore, he determined that in the short run the Buy America policy actually reduced domestic output by \$339 million. Only in the long run is there an industry-wide subsidy effect and then the additional output is only \$1 million. This is based on the concept that as, for example, manufacturers produce engines for defense, commercial buyers are forced to look elsewhere. If they are more price sensitive than defense purchasers—a likely case in the short run—commercial buyers more than compensate for the Buy America policy by turning to imports, substitutes, or doing without. Only in the cases in which government purchases are greater than domestic supply or industry output is infinitely elastic will there be any substantial subsidy effect. This is a highly unlikely case unless one takes a very disaggregate look at economic sectors.¹⁶ Thus, the conclusion is that the Buy America policy is ineffective as a policy to address balance-of-trade and employment issues. Furthermore, whereas it may be effective as a means of altering domestic output towards specific defense goods, it provides a negative or at best marginally positive subsidy to industry as a whole. This leads to the conclusion that appropriate economic

goals can be reached more efficiently by other means.

Subsidies differ from other trade-distorting measures in that they raise the effective price producers receive while not influencing consumer prices directly.¹⁷ Furthermore, as stated earlier, subsidies are the optimal policy tool to use when distortion exists in the domestic economy—the only cases found in the theory section to warrant government protective efforts for defense industries. Unfortunately, it is difficult to measure the extent of industrial subsidies. This difficulty stems from the fact that subsidies are often indirect and capital in nature and to determine this effect, one must compute the current *ad valorem* value of the subsidy. An example of an indirect subsidy would be the legality of U.S. firms "expensing" research and development expenditures in the year incurred despite the fact that the gains from the expenditure will accrue over time. This clearly encourages R&D in the United States and, therefore, distorts production and trade towards technology-intensive goods. This subsidy was estimated in a study for the Joint Economic Committee to be over \$500 million in 1970.¹⁸ An example of a capital subsidy would be a government loan granted at below commercial interest rates. In this case the yearly value of the subsidy must be determined to measure its effect on production and trade. Thus in order to provide consistency it is necessary to convert all indirect and capital subsidies to a current value by industry. Data in this area are not available in all cases.

In the United States, direct subsidies—cash grants—to industry are rarely used. Yet, it has been estimated that the total effect of direct and indirect subsidies in the United States exceeded \$60 billion or one quarter of the Federal budget in 1970.¹⁹ In defense industries, subsidies with extensive results are government-funded research and development, the investment tax credit, and government-

guaranteed student loans. Each of these subsidies acts to alter production towards and lower costs for defense industries, producers of capital-intensive, high-technology items. Unfortunately, no known effort has been made to determine the current *ad valorem* effect these indirect subsidies have on specific industries. The only specific subsidy to defense industries found was the subsidy effect of credits and guarantees for foreign military sales. This export subsidy was determined to be \$9 million in 1970 or approximately 0.3 percent of arms exports value in that year.²⁰

The data in Europe are somewhat better, perhaps indicating greater emphasis on subsidies to achieve policy goals. France, owing to the nature of the organization of its input-output table, was found to be the only country that reported significant direct subsidies to its armaments industry as an industry. From the period 1962 to 1971 the subsidy was found to average about 3 percent of defense industry output. This resulted in French arms exports being an estimated 10-13 percent higher than they otherwise would have been.²¹ That direct subsidies may greatly understate the extent of total subsidy to particular industries is graphically shown in the case of Great Britain and Germany. Whereas direct subsidies to the British aerospace sector were around 0.37 percent in 1972, direct and indirect subsidies to a critical subsector, the aircraft industry, were estimated to be 12.5 percent of output.²² Similarly, direct subsidies to the German nonauto vehicular sector were around 0.3 percent in 1970, yet the total subsidy to the aircraft industry was estimated to be 13.1 percent in the same year.²³ Clearly, subsidies will have far greater trade-distorting consequences in some defense industries than others, and indirect subsidy effects may swamp direct subsidy effects. It is interesting to note that in all three European countries, the

aircraft industry is the manufacturing industry most dependent on domestic defense purchases.²⁴ This would appear to be the classic case of the national defense protection argument in action.

It remains to determine what effect the subsidies have in distorting trade of defense goods. A caveat to this analysis should be that the results probably overstate the extent of true distortion. Subsidies are often given to offset other costs imposed by governments on firms. If, for example, a British corporation is forced to use British steel, then a subsidy may only offset the extra cost of British steel and not actually reduce free market production costs. One method of attempting to determine the effect of subsidies on trade is to attempt to correlate statistically subsidies with trade. An exhaustive effort along these lines was done in the early 1970s for the British economy and no significant correlation was found.²⁵ The conclusion of this study was that subsidies do not distort overall British trade to a substantial extent. This does not mean, however, that subsidies in particular sectors do not affect trade in that sector. The key variables that must be known are the extent of subsidy, the export emphasis of the industry sector, and the importance of the export to world exports. Clearly, the greater each of these variables is, the greater the effect on trade of that good. Table IVa shows, by country, the effect that direct subsidies would have had on trade in the years 1973-1977 had the subsidy to output ratio remained the same from 1970 on.²⁶ Table IVb does the same for 1981-1985. As only direct subsidies shown in input-output tables were used, the total effect of subsidies is probably understated from the results that would be obtained through a more rigorous examination of direct and indirect subsidies. In any event, comparison of Table IV with Tables II and III shows that the trade effect of subsidies is swamped by that of government

procurement practices. If one assumes, however, that subsidies to British and German aircraft industries are representative of total direct and indirect subsidies to defense industries in general, then the estimated increase in exports as a consequence of subsidies would jump from about 1 percent to 5 percent in Great Britain, 6.5 percent to 14 percent in France, and 2 percent to 8.5 percent in West Germany. This would more than triple the subsidy-created exports of these countries and, consequently, more than triple the U.S. diverted exports. Still, the effects of government procurement practices dominate the subsidy effects.

Examination of government procurement practices has shown that not only are they the key trade-distorting measure, but also that these policies do little to achieve stated goals. Subsidies, on the other hand, are appropriate policies to achieve national defense goals in the face of distortions. Whereas it is impossible to state that each nation has provided the optimal subsidy, the extent of subsidy should indicate the level of interference each government perceives as necessary to correct observed distortions.

Summary and Conclusion. All NATO nations agree that rationalization, standardization, and interoperability within the alliance must be improved. Yet, on both sides of the Atlantic, there is fear of the economic consequences of such a move. As a result, nations have erected barriers to protect domestic producers that have distorted trade in defense goods and raised the costs of providing defense. This article has explored the economic rationale for trade distorting measures and the nature and effect of the existing protective policies. Table I is a graphic portrayal of the problem facing NATO. It shows that, of the nations surveyed, each has increased its independence from foreign defense imports during the

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seventies while, in general, increasing the export emphasis of its defense sector. This effort to achieve military independence and develop a comprehensive defense industrial base has resulted in real economic costs to NATO.

Economic theory has shown that government intervention to influence trade is a superior solution to free trade only when distortion exists in the market. In the case of the defense market, the optimal intervention policy is a subsidy. Subsidies are appropriate in cases in which the private market fails to adjust for long-term needs. For example, subsidies are appropriate to create surge capacity and to protect against an embargo threat.

Trade-distorting measures exist primarily in two forms—government procurement practices and subsidies. Although data on indirect subsidies are incomplete, subsidies appear to have far less of an effect on trade in defense goods than procurement practices. Furthermore, procurement practices achieve little of their stated goal of balancing trade, provide at best marginal industry-wide protection, and cause real economic costs for national military budgets.

Recommendations. The most promising avenue for alleviating the cost of adverse procurement practices would be to standardize Memoranda of Understanding on a NATO-wide level and push for multilateral acceptance. Standardized agreements that substantially reduce government procurement barriers would increase the market for U.S. exports while improving the two-way street. Based on Tables II and III, if NATO members had not discriminated against foreign producers, U.S. defense exports would have increased over \$500

million per year in 1973-77 and the defense goods trade ratio would have shifted from ten to one in favor of the United States to around four to one. This would do much to quiet the political arguments of Europe and convince Europe of our dedication to RSI. This cooperative posture would be attained at lower costs to the Defense Department with only minimal shifts in trade and employment. In addition, this approach would be consistent with traditional U.S. most-favored nation trade policy and would insure welfare gains for alliance members. Finally, there must be a realization and a general acceptance that nations subsidize to achieve legitimate goals. Efforts should be channelled towards eliminating the economic incentive to subsidize rather than the subsidies themselves.

Viable European defense industries, coupled with improved trust and information flow, are prerequisites to the formation of a free market for defense goods. While there may be adjustment costs on both sides of the Atlantic in achieving the prerequisites, in the long run all alliance members will share in economic gains as joint security is enhanced.

BIOGRAPHIC SUMMARY



Major William G. Foster, a graduate of the U.S. Military Academy, holds the MBA degree from Harvard Business School. An Armor officer, he has served in line and staff positions in the United States and Vietnam. Major Foster

is now an Assistant Professor in the Department of Social Sciences at the U.S. Military Academy.

TABLE I—DEFENSE TRADE RATIOS

YEAR	M_D/M_T^a	X_D/X_T	$M_D/MILEX$	$X_D/MILEX$
FRANCE				
65	.00788	.01002	.01246	.01672
73	.00053	.02316	.00210	.08928
74	.00038	.01512	.00188	.06591
75	.00056	.01271	.00248	.05578
76	.00078	.01617	.00375	.06943
77	.00071	.02000	.00338	.08781
GERMANY				
65	.01068	.00570	.02289	.01326
73	.01138	.00207	.05271	.01180
74	.00790	.00224	.04055	.01474
75	.00768	.00466	.03930	.02871
76	.00565	.00636	.03234	.04205
77	.00473	.00677	.02944	.04906
UK				
65	.00388	.00847	.00900	.02030
68	.02375	.00931	.05728	.02461
73	.00231	.01956	.01061	.07074
74	.00164	.01396	.00938	.05731
75	.00166	.01123	.00882	.04899
76	.00424	.01446	.02167	.06094
77	.00232	.01418	.01318	.07251
US				
67	.00530	.08428	.00151	.02958
73	.00231	.06872	.00217	.06253
74	.00111	.04670	.00140	.05355
75	.00136	.04352	.00154	.05168
76	.00077	.05131	.00110	.06482
77	.00076	.05693	.00119	.06837

Source: *World Military Expenditures and Arms Transfers, U.S. Arms Control and Disarmament Agency*, various years.

^aAbbreviations:

M_D is arms imports

M_T is total imports

X_D is arms exports

X_T is total exports

MILEX is military expenditures

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**TABLE IIa—THE ESTIMATED EFFECT OF GOVERNMENT PROCUREMENT PRACTICES ON TRADE
UNITED STATES
1973-1977**
(All numbers in millions of current year dollars)

Year	US Defense Imports ^a	Hypothetical Defense Imports ^b	Total Diverted Imports	NATO-Europe Diverted Imports ^c
73	120	810	640	380
74	120	570	450	270
75	140	670	530	320
76	100	480	380	230
77	120	570	450	270

^aSource: *World Military Expenditures and Arms Transfers 1968-1977*.

U.S. Arms Control and Disarmament Agency, 1979.

^bUsing index of discrimination = 476% and rounding.

^cDuring the period 1973-1977 approximately 60% of defense imports were purchased from NATO-Europe and rounding.

**TABLE IIb—THE PROJECTED EFFECT OF GOVERNMENT PROCUREMENT PRACTICES ON TRADE
UNITED STATES
1973-1977**
(All numbers in millions of 1981 dollars)

Year	US Defense Imports ^a	Hypothetical Defense Imports ^b	Total Diverted Imports	NATO-Europe Diverted Imports ^c
81	220	1050	830	500
82	230	1090	860	520
83	240	1140	900	540
84	250	1190	940	560
85	260	1240	980	590

^aSources: Military expenditures are taken from *Annual Report, Fiscal Year 1981*, Department of Defense, adjusted for NATO definition, adjusted by the mean defense imports as a percent of military expenditures for 1973-1977 and rounded.

^bUsing index of discrimination = 476% and rounding.

^cDuring the period 1973-1977 approximately 80% of defense imports were purchased from NATO-Europe and rounding.

TABLE IIIa—THE ESTIMATED EFFECT OF GOVERNMENT PROCUREMENT PRACTICES ON TRADE EUROPE 1973-1977
(All numbers in millions of current year dollars)

Year	US Defense Imports ^a	Hypothetical Defense Imports ^b	Total Diverted Imports	US-Diverted Imports ^c
FRANCE 1973-1977				
73	20	100	80	70
74	20	100	80	70
75	30	140	110	100
76	50	240	190	170
77	50	240	190	170
UNITED KINGDOM 1973-1977				
73	90	460	370	330
74	90	460	370	330
75	90	460	370	330
76	240	1230	990	890
77	150	770	620	560

^aSource: *World Military Expenditures and Arms Transfers, 1968-1977*, U.S. Arms Control and Disarmament Agency, 1979.

^bFor France, the assumption is the index of discrimination is 476%. For the U.K., the assumption is the index of discrimination is 514%. All numbers are rounded.

^cFor both France and the United Kingdom, approximately 90% of defense imports were from the United States and rounding.

TABLE IIIb—THE PROJECTED EFFECT OF GOVERNMENT PROCUREMENT PRACTICES ON TRADE EUROPE 1981-1985
(All numbers in millions of 1981 dollars)

Year	US Defense Imports ^a	Hypothetical Defense Imports ^b	Total Diverted Imports	US-Diverted Imports ^c
FRANCE 1981-1985 (Projected)				
81	70	330	260	230
82	70	330	260	230
83	70	330	260	230
84	80	380	300	270
85	80	380	300	270
UNITED KINGDOM 1981-1985 (Projected)				
81	260	1340	1080	970
82	260	1340	1080	970
83	270	1390	1120	1010
84	280	1440	1160	1040
85	290	1490	1200	1000

^aSources: Projected defense imports were determined by taking actual 1978 military expenditures projecting forward to 1981 using a 3% real growth rate and inflation rates as projected by the *DoD Annual Report, Fiscal Year 1981* assuming a constant exchange rate. From 1981 to 1985 the assumption is again a 3% real growth rate. Military expenditures are adjusted for the mean defense imports as a percent of military expenditures and rounded.

^bFor France, the assumption is the index of discrimination is 476%. For the U.K., the assumption is the index of discrimination is 514%. All numbers are rounded.

^cFor both France and the United Kingdom, approximately 90% of defense imports were from the United States and rounding.

**TABLE IVa—THE ESTIMATED EFFECT OF DIRECT SUBSIDIES ON
NATO DEFENSE TRADE
1973-1977**
(All numbers in millions of current year dollars)

Year	Exports ^a	Subsidy Created Exports	Diverted US Exports
UNITED KINGDOM			
73	600	5	4
74	550	5	4
75	500	5	4
76	675	5	4
77	825	10	7
FRANCE			
73	850	60	40
74	700	50	35
75	675	40	30
76	925	60	40
77	1300	90	65
FEDERAL REPUBLIC OF GERMANY			
73	140	5	4
74	200	5	4
75	420	10	7
76	650	15	10
77	800	20	14
UNITED STATES			
Year	Exports	Subsidy Created Exports	Diverted NATO- Europe Exports
73	4900	10	9
74	4600	10	9
75	4700	10	9
76	5900	10	9
77	6900	10	9

^aSource: *World Military Expenditures and Arms Transfers, 1968-1977*, Arms Control Disarmament Agency, 1979.

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**TABLE IVb—THE PROJECTED EFFECT OF DIRECT SUBSIDIES ON
NATO DEFENSE TRADE
1981-1985
(All numbers in millions of 1981 dollars)**

Year	Exports ^a	Subsidy Created Exports	Diverted US Exports
UNITED KINGDOM			
81	1250	10	7
82	1300	10	7
83	1300	10	7
84	1350	15	10
85	1400	15	10
FRANCE			
81	1900	130	90
82	1950	130	90
83	2000	130	90
84	2050	140	100
85	2150	140	100
FEDERAL REPUBLIC OF GERMANY			
81	1250	30	20
82	1300	30	20
83	1300	30	20
84	1350	30	20
85	1400	30	20
UNITED STATES			
			Diverted NATO- Europe Exports
81	8900	20	18
82	9200	20	18
83	9600	20	18
84	10100	20	18
85	10500	20	18

^aIn the case of the United Kingdom, France, and the United States, exports were assumed to average the same percentage of military expenditures as in 1973-1977. Germany's exports were assumed to be 5% of military expenditures as Germany has manifested a growing military export trend and 5% is a reasonable extrapolation. Military expenditures were determined for European nations as in footnote a of Table IIIb and for the United States as in footnote a of Table IIb.

NOTES

1. Secretary of Defense, *Rationalization/Standardization Within NATO*, a Report to Congress on 31 January 1976, p. 53, and Thomas A. Callaghan, *U.S./European Economic Cooperation in Military and Civilian Technology* (Washington: Georgetown University, Center for Strategic and International Studies, March 1976), p. 34.

2. Oliver C. Boileau, "Statement," U.S. Congress, Senate, Special Committee on NATO Standardization, Interoperability and Readiness Committee on Armed Services, *NATO Standardization, Interoperability and Readiness*, Hearings (Washington: U.S. Govt. Print. Off., 1978), p. 1250.

3. Statement by Thomas Callaghan in a summary of his findings printed in *Survival*, May/June 1975, p. 131.

4. For a detailed explanation, see any international economics text such as Kindleberger and Lindert's *International Economics* (Homewood, Ill.: Irwin, 1978) and refer to the section on the Stolper-Samuelson theorem.

5. In a recent article an economic case is made for Israeli production of their own fighter based on a fear of future embargo and learning curve gains by producing domestically. It is argued that the optimal government policy is to subsidize production of the defense good to equate the domestic price to the going world price. Then, the government through either its production capabilities or monopsonistic power should adjust national output to equate the marginal cost of foregone current income due to the subsidy to the marginal benefit from current additional investment in learning weighted by the probability of embargo. Depending on the exogenous variables of the probability of embargo, the future embargo contingent consumption, the learning curve, and the initial production cost, the country which under strict comparative advantage considerations would be a net importer may end as an importer, exporter or autarkic. See Ruth W. Arad and Arye L. Hillman, "Embargo Threat, Learning and Departure from Comparative Advantage," *Journal of International Economics*, May 1979, pp. 265-276.

6. Earl A. Thompson, "An Economic Basis for the 'National Defense Argument' for Aiding Certain Industries," *Journal of Political Economy*, February 1979, pp. 1-37.

7. Work in this area draws heavily on the economic literature concerning the theory of "second best." Essentially the theory determines that in the face of market distortion or potential market distortion, free trade is not the optimal policy from an economic point of view. The seminal work in determining the optimal policy has been done by Jagdish Bagwati of M.I.T. See his article, "The Generalized Theory of Distortions and Welfare" in Jagdish Bagwati, et al., eds., *Trade, Balance of Payments and Growth* (Amsterdam, North Holland: Elsevier, 1971) for an excellent overview. In the area of the threat of embargo, Wolfgang Mayer, drawing heavily on Bagwati's work, has determined that the optimal policy is a subsidy. The purpose of the subsidy is to alter the output of the country so that welfare can be maximized intertemporally given an embargo threat adjustment impediments in the economy, and zero foresight in the utility function of consumers. His rather complex formula determines the optimal subsidy to be positively correlated with the probability of embargo, the importance of the military good after the embargo, the difficulty of altering the economy's output from civilian to military goods after the embargo, and the difficulty in surging military output after the embargo. The optimal subsidy is negatively correlated with the rate of transformation of civilian goods into military goods, the preembargo importance of civilian goods consumption, and the preembargo free market price ratio between military goods and civilian goods. The assumption is made that the time period to adjust to the subsidized production mix is longer than the time from embargo announcement to enforcement and that the latter time entails adjustment costs. Thus, if one makes the assumption that defense goods are technology and capital intensive, nations have an incentive to increase subsidies if they do not trust their trading partners, lack technological capabilities, lack a strong industrial base, and have low defense output. For a more detailed examination see Wolfgang Mayer, "The National Defense Argument Reconsidered," *Journal of International Economics*, November 1977, pp. 363-379.

8. The Culver-Nunn Amendment of 1977 allows the Secretary of Defense to waive the "Buy America" policy if NATO standardization will be enhanced.

9. For a more rigorous explanation of the basic methodology see either J.D. Richardson, "Statement," U.S. Congress, Senate, Joint Economic Committee, *The Subsidy Aspect of a "Buy American" Policy in Government Purchasing*, Hearings (Washington: U.S. Govt. Print. Off., 1972), or Thomas C. Lowinger, "Discrimination in Government Procurement of Foreign Goods in the U.S. and Western Europe," *Southern Economic Journal*, January 1976, pp. 451-460.

10. For this explanation to be rigorously accurate, both the composition of imports and the national input-output matrix would have to stay the same. The only commodity class that has a significantly different index of discrimination is transportation equipment (approximately 50 percent of other indexes). Calculations of indexes over varying years and input-output matrices have not shown wide variance. For comparisons see Richardson; Charles Wolf, Jr., and Associates, *Offset for NATO Procurement of the Airborne Warning and Control System: Opportunities and Implications* (Santa Monica, Calif.: Rand, February 1976), pp. 43-47.

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11. The bias against the United States stems from two areas; a third area would probably bias the results for the United States. First, the aggregated nature of the commodity classes tends to underemphasize U.S. advantages in specific disaggregated areas. Second, due to the nature of the available data, comparisons can only be made between government and civilian imports, not defense and civilian imports. Thus, whereas in the United States defense imports total roughly 90 percent of government imports and therefore the index of discrimination is reasonably accurate, for European nations with more active government sectors, the index may understate the discrimination in the defense goods sectors. Finally, inasmuch as the government buys domestic resources, prices are driven up forcing civilian firms to look overseas, thus biasing upward the index of discrimination. As the United States has a relatively smaller government sector, its effect on price would be minimal. It is highly unlikely that this latter effect would totally counteract the two prior biases.

12. See references in notes 10 and 11 as well as Robert F. Baldwin, *Nontariff Distortions of International Trade* (Washington: Brookings Institution, 1970).

13. Losinger.

14. Baldwin.

15. Norman S. Fieleke, "The Buy America Policy of the United States Government, Its Balance of Payments and Welfare Effects," *New England Economic Review*, July/August 1969, pp. 2-18. Fieleke goes on to estimate that a 25 percent price preference would have a 23 percent budgetary cost of procurement diverted and a 31 percent cost if a 75 percent price preference is granted, p. 9.

16. Richardson, pp. 234-242. Richardson assumes the short-run price elasticity of supply is 2 and the elasticity of supply of imports is 1. In the long run, he assumes 20 and 10 respectively. Goods must be perfect substitutes although similar effects will be seen for imperfect substitutes.

17. This is theoretically accurate only for the small country facing constant terms of trade.

18. U.S. Congress, Senate, Joint Economic Committee, "The Economics of Federal Subsidy Programs," a Staff Study, 11 January 1972, p. 140.

19. *Ibid.*

20. *Ibid.*

21. Melvyn B. Krauss, *Quantification of the Effect of Non-Tariff Barriers in the Major Trading Countries* (Washington: U.S. Dept. of Labor, November 1978), p. 32. Krauss assumed supply elasticity equal to 1 and domestic demand elasticity equal to 0. This assumption will be relaxed later in Table IV.

22. Krauss, p. 60 and Warner M. Corden and Fels Genhard, eds., *Public Assistance to Industry: Protection and Subsidies in Britain and Germany* (Boulder, Colo.: Westview Press, 1976), p. 156.

23. Krauss, p. 58; Corden and Fels, eds., p. 42.

24. Roger Facer, *The Alliance and Europe: Part III Weapons Procurement in Europe—Capabilities and Choices*, Adelphi Papers, no. 108 (London: International Institute for Strategic Studies, 1975), p. 14.

25. Geoffrey Denton, et al., *Trade Effects of Public Subsidies to Private Enterprise* (New York: Holmes & Meier, 1975), p. 93.

26. The basic approach was developed by Krauss, pp. 15-20 and generalized in National Planning Association, "Methodologies for Quantifying Trade Distorting Practices," pp. 69-73. The following assumptions and data sources were used to derive the table. The subsidy rate for Great Britain was determined by taking the subsidy rates for various industries as determined by Krauss, p. 60, and weighting those subsidies by the appropriate percentage of defense purchases for each industry as determined by Facer, p. 14. The same procedure was followed for Germany. In the case of France, the 3 percent subsidy rate was used. These subsidy rates were then applied to the formula developed in National Planning Association, p. 80 for each year. In all cases the export supply elasticity was assumed to be 20, a common assumption in manufacturing industries. The export demand elasticities were taken from Data Resources calculations and were -.41, -.58, -.9, for Great Britain's manufacturing goods and Germany and France's total goods respectively. As the only direct subsidy found for the United States was an export subsidy, no such calculations had to be made. The export demand elasticity for U.S. defense goods was assumed to be -.75, the Data Resources calculation for export demand elasticity for capital goods. NATO-Europe exports almost 90 percent of all non-U.S. OECD defense exports and it was assumed, therefore, that extra U.S. exports would be taken from NATO-Europe on that percentage. Similarly, as the United States exports roughly 70 percent of the non-Great Britain, etc., OECD arms exports, it was assumed that 70 percent of extra European exports would be taken from the United States.

