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Contents

Abstract

On the basis of a world matrix of international trade in major-conventional weapons for 1985, a comparison is made between the regional structure of arms trade and the regional structure of trade in civilian goods from a comparable technological background. It turns out that there are striking divergencies between both kinds of trade structures, even within military alliances. These divergencies are then captured by an indicator which is named "revealed political preference" (RPP). It is argued that introducing a free-trade regime within NATO and other industrialised western countries would make arms trade increase, and, in particular, make the shares of Japan and West Germany in arms exports rise manifold, thereby raising world economic welfare.

It is suggested that different hypotheses for explaining world arms-trade structures are relevant according to the region analysed, like the trading-with-the-enemy hypothesis with respect to the arms trade between advanced and less-developed countries, or the military-industrial-complex hypothesis for arms trade within alliances.

International Arms Trade: Revealed Political Preferences or Cartel Behaviour*

1. Outline

1. Trade in arms is different from trade in civilian goods and services. The main distinguishing feature is that arms-exporting countries must be aware of the "trading-with-the-enemy" risk. At the same time, the importing country faces the risk of being cut off from additional supplies or from the supply of spare parts in cases of emergency. Both kinds of risks are not necessarily symmetrical; supplying a potential enemy with weapons can obviously be more detrimental to national security than buying from a potential enemy. Arms exports, therefore, tend to be under close governmental surveillance for external security reasons, whereas imports of weapons are merely under control for internal security reasons like any domestic arms trade (with governments claiming the legal monopoly to exert violence within national boundaries).

2. Foreign trade in civilian goods is generally not subject to comparable controls. In fact, the communis opinio as well as the legal framework of international trade provide for an unrestricted international exchange of goods. The idea be-

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hind this liberal stance is that free trade maximises the welfare of all trading countries. However, when introducing the arguments of external and internal security, the classical free-trade approach becomes far more complicated, not only due to the existence of military goods: many civilian goods can likewise be used for military ends - e. g., combustion engines; apart from such "dual goods", one might mention the wide range of "dual technologies", i.e., dual know-how, which improves the technological standard of the importing country (an example being computer-assisted logistics). Basically, even the export of a truly civilian good enables the importing country to divert scarce resources towards military production. Gains from trade, however, also accrue to the exporting country. Therefore, the effects on both countries' national security should, by and large, be balanced, such that trade with purely civilian goods under normal (peaceful) circumstances is not regarded as an exemption to the standard free-trade argument. This means that problems of compatibility between the (liberal) international trading order and the requirements of national security are confined to trade with strictly military goods and to trade with dual goods and dual technologies.

3. Using the results of trade, i.e., trade statistics, as an indicator of production costs differentials across countries, as postulated by Ricardo, has become common practice in empirical economics today. According to the concept of

revealed comparative advantage (RCA)[1], the actual trade structures of countries reflect the product structures of their ability to compete on world markets[2]. A country exporting certain kinds of products, relative to other products, more successfully than other countries is said to possess a comparative cost advantage in this line of production. Naïvely applying this concept can and has been criticised[3]. In case trade flows are distorted by market interventions, the information provided by the RCA measure becomes distorted, too. This can be expected to be particularly true when measuring comparative advantage in producing military products. In fact, under certain conditions, which will be stated below, the observed differentials between the RCA index for military goods and the RCA index for civilian goods produced under equivalent technological conditions can lead to a new index which will be named the "revealed poli-

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1 Bela Balassa, "Trade Liberalization and 'Revealed' Comparative Advantage". In: The Manchester School of Economic and Social Studies, Manchester, Vol. 33 (1965), pp.99-123.

2 A crucial assumption of RCA analysis is that the impact on trade flows of international differences in preferences does not distort this indicator of relative cost structures. As can be shown, the indicator is rather robust in this respect except from really extreme constellations. Compare the seminal study by Wassily Leontief, "The Use of Indifference Curves in the Analysis of Foreign Trade". In: W. Leontief, Essays in Economics, Theories and Theorizing, Oxford University Press, New York, London, 1966, pp. 116-125 (Reprint from: The Quarterly Journal of Economics, Vol. 47 (1933), pp. 493-503).

3 For a theoretical discussion of RCAs see e.g., Arye L. Hillman,"'Revealed Comparative Advantage' and Comparative Advantage as Indicated by Pre-Trade Relative Prices". In: Weltwirtschaftliches Archiv, Vol. 116, 1980, pp. 315-321, Harry P. Bowen, "On Measuring Comparative Advantage: Further Comments". In: Weltwirtschaftliches Archiv, Vol. 122, 1986, pp. 379-381, and the literature quoted therein.

tical preference".

4. In the next section we describe the concept of "revealed political preference", state the empirical requirements for constructing such a measure, and then present the world matrix of international trade in major conventional weapons in comparison to the same matrix for comparable civilian goods.

In the third section, it is discussed whether the observed structural differences can be explained by conventional market structure/conduct models, or by models referring to an analogy between military alliances and cartels. The final conclusions are concerned with conjectures which stress the relevance of basically non-economic factors in explaining revealed political preference.

2. Empirical Evidence

a. The Concept of "Revealed Political Preference"

5. The "revealed political preference" (RPP) will be defined as the difference between two indexes of "revealed comparative advantage" (RCA), one for military goods and one for civilian goods, which are supposed to be produced under the same cost conditions:

$$RPP^{mil}_{i,x} = \frac{RCA^{mil}_{i,x}}{RCA^{civ}_{i,x}} - 1 \qquad ; -1 \leq RPP^{mil}_{i,x} \leq \infty$$

with

$$RCA^{mil}_{i,x} = \frac{x^{mil}_i}{\Sigma_i \, x^{mil}_i}$$

$$RCA^{civ}_{i,x} = \frac{x^{civ}_i}{\Sigma_i \, x^{civ}_i}$$

mil: major conventional weapons
i: country suffix
civ: civilian goods
x: exports

Where:

$RPP_{ix} < 0$ means political discrimination of arms exports of country i (RPP = -1 reflecting maximum political discrimination).

$RPP_{ix} > 0$ indicates political promotion of arms exports of country i.

$RPP_{ix} = 0$ refers to the absence of observed political preferences.

The same formula and interpretation of results holds true for RPP_{im}, i.e., for a comparison of import structures. The index does not reflect whether the source of political preferences is with the home country or with the foreign countries.

6. Drawing conclusions from the RPP indicator would in particular require that:

- the elasticity of substitution of military goods for civilian goods is zero. That is to say, regulations of arms trade do not affect trade in civilian goods;
- the quality standards and technological sophistication between the two baskets of goods do not differ;
- the RCA measure for the civilian products is not distorted by trade policies at home or abroad, for instance by tariffs or quotas;
- a country's trade in military goods is not artificially raised or lowered by another country's interventions.

At first sight, these requirements would preclude any RPP analysis of the real world. But when analysing trade in strictly military goods, such as major conventional weapons, the possibilities of substitution for civilian consumption should indeed be nearly zero. It may be argued that, via general interdependencies, trade regulations of one activity affect all others as well (e.g. through distorting currency exchange rates), but this interdependency can well be supposed to be of very little importance for the RCA indicator in civilian trade. At a first glance, the second requirement seems to contradict the assumption of zero substitution in consumption; it does not do so, however, because it is concerned with production possibilities, i.e., with marginal rates of transformation between the production of weapons and of civilian goods (not with marginal rates of substitution). Taking all those engeneering products traded under the SITC 7 heading - "Machinery and Transport Equipment" - as a proxy for the "civilian goods" should guarantee the

possibility of almost perfect conversion in factor use between civilian products and major conventional weapons. The third requirement is concerned with matters of fact. The literature seems not to be controversial in that trade barriers are less important in the SITC 7 field[1]; on the other hand, trade as well as the production of major conventional weapons is under tight government control. Finally, the RPP index does not reveal the source of political preference. For instance, RPP < 0 can be due to voluntary export restraints of the producing country, or to import protection of the potential importing countries, or to both. This would say that interpretation of country results should indeed take the results achieved for other countries simultaneously into account.

b. Arms Trade Structures

7. The regional structure of world arms trade is not readily available. The world matrix of trade in major conventional weapons has been compiled by giving each transaction in a certain weapon the same weight ("transaction" referring to contracts or deliveries made in 1985; see the notes to Table 1) - independent from the number of weapons and from the va-

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[1] Trade barriers in the form of tariffs are lowest in SITC 7 as compared to other industrial products. Non-tariff trade barriers are most important in sectors such as textiles, clothing (SITCs 6 and 8), and agricultural products (SITC 0, 1 and 4). Since there is one major sector besides SITC 7 - namely chemicals (SITC 5) - whose protection is below average, the above-mentioned exchange rate effects should be negligible. Compare Shailendra J. Anjaria, Naheed Kirmani, Arne B. Petersen, Trade Policy Issues and Developments. IMF Occasional Paper No. 38, Washington D.C., July 1985, and the literature quoted therein.

Table 1: The Regional Structure of Arms Trade and of Trade in Licenses for Arms Production[a] (Major Conventional Weapons)[b], Status 1985

Importing Country / Exporting Country	NATO Total	NATO US	NATO France[c]	NATO UK	NATO FRG	Warsaw Pact Total	Warsaw Pact USSR	Warsaw Pact GDR	Less-developed Countries Total	Non-Aligned Countries[d]	Other Industrial Countries[e]	Total	Structure of World Supply
Nato													
Total	18.4 (31.5)	1.3 (0.9)	0 (0.9)	1.8 (2.7)	1.2 (0.9)	0.2 (2.7)	0	0	73.9 (44.1)	3.2 (2.7)	4.3 (18.9)	100 (100)	67.7 (83.5)
US	24.3 (43.9)	-	0 (1.8)	2.6 (5.3)	1.9 (1.8)	0	0	0	65.5 (21.1)	2.6 (1.8)	7.5 (33.3)	100 (100)	30.2 (42.9)
France[c]	8.2 (23.8)	0.8 (0)	-	0	1.6 (4.8)	0.8 (9.5)	0	0	88.5 (57.1)	0.8 (4.8)	1.6 (4.8)	100 (100)	14.6 (15.8)
UK	14.9 (8.3)	6.0 (8.3)	0	-	4.5 (0)	0 (8.3)	0	0	73.1 (75.0)	6.0 (0)	6.0 (6.0)	100 (100)	8.0 (9.0)
FRG	28.1 (17.6)	0	0	3.1 (0)	-	0	0	0	59.4 (76.5)	12.5 (5.9)	0	100 (100)	3.6 (12.8)
Warsaw Pact Total	0	0	0	0	0	16.5 (50.0)	0.6 (0)	11.4 (0)	80.4 (41.7)	3.2 (8.3)	0	100 (100)	17.9 (9.0)
USSR	0	0	0	0	0	16.4 (54.5)	-	11.8 (0)	80.3 (36.4)	3.3 (9.1)	0	100 (100)	17.2 (8.3)
Less-Developed Countries Total	4.2 (20.0)	2.1 (0)	0	0 (20.0)	0	0	0	0	95.8 (80.0)	0	0	100 (100)	10.8 (3.8)
Non-Aligned Industrial Countries[d]	11.5 (0)	0	0	0	0	0	0	0	69.2 (80.0)	15.4 (0)	3.8 (20.0)	100 (100)	2.9 (3.8)
Other Industrial Countries[e]	0	0	0	0	0	0	0	0	83.3 (0)	0	16.7 (0)	100 (0)	0.7 (0)
Structure of World Demand	13.2 (27.1)	1.1 (0.8)	0 (0.8)	1.2 (2.3)	0.8 (1.5)	3.2 (6.8)	0.1 (0)	2.0 (0)	77.3 (46.6)	3.2 (3.0)	3.2 (16.5)	100 (100)	100 (100)

[a]The first figure refers to the share of the region in total supply of the respective exporter; the figure in brackets refers to the same share regarding trade in licences for arms production. - [b]On the basis of the number of transactions with major conventional weapons (actual deliveries plus orders in 1985). - [c]France is a contracting party to NATO but not part of the integrated military command structure. - [d]Austria, Finland, Ireland, Sweden, South Africa, Switzerland, Yugoslavia. - [e]Australia, Japan, New Zealand.

Source: Stockholm International Peace Research Institute (SIPRI), World Armament and Disarmament - SIPRI Yearbook 1986, Oxford, New York 1986. - Authors' compilations and calculations.

lue of the transaction[1] (Table 1). The underlying hypothesis is that, in the case of the number of notifications being large enough, the errors tend to be small. For some figures in Table 1, a comparison with value-based trade statistics is possible, namely with figures concerning the regional share of arms exports to less-developed countries; such a comparison reveals striking congruencies: the shares of arms exports to LDCs in the case of the FRG, USSR and LDCs themselves (intra-regional trade) are 61.6 per cent; 80.5 per cent; 95.4 per cent - according to Table 1 the figures are: 59.4 per cent; 80.4 per cent; 95.8 per cent[2]. Systematic deviations exist with respect to the regional structure of supply, where the big suppliers, the USSR and the US, exhibit relatively small shares in Table 1 (last column). This would say that these two countries realize a larger unit value per contract or delivery[3].

8. Even when allowing for the inherent limitations of the fact-finding process, the world trade matrix reveals that

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1 For example: the delivery of one E-2C Hawkeye (airborne early warning system) from the US to Egypt in 1985 (value: U.S. $ 175 mill.) has been given the same weight as the delivery of probably ninety-six AM-39 Exocet missiles from France to Iraq (no price information available).

2 Or: In Udis the information is given that the value share of West Germany in world arms trade between 1979 and 1983 was 3.91 per cent (in Table 1: 3.6 per cent) etc. Compare Bernard Udis, "The High Technology Arms Race: The West European Case". In: Conflict Management and Peace Science, Vol. 9, No. 1, Fall 1985, pp. 19-31. Udis gives reference to estimates in US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers, Washington D.C. 1985, Table III, pp. 131-134.

3 See SIPRI, Yearbook 1986, pp. 324 and 338 for data on the country structure of world arms exports.

arms trade within each of the two big military alliances is of a lesser magnitude than one might expect: the share of intra-alliance trade is 18.4 per cent in the case of NATO, and 16.5 per cent in the case of the Warsaw Pact. In addition:

- the main industrial countries, and the USSR, imported very few heavy conventional weapons, not even from the member countries of the respective alliance;
- NATO is different from Warsaw Pact countries in that the supply of the former is not left almost exclusively to the leading country[1];
- the main export markets of all countries considered are the less-developed countries; for instance almost 90 per cent of France's arms exports go to LDCs (USSR: 80 per cent)[2].

9. Table 1 also provides a compilation of trade in licenses. Such trade can be considered a substitute for trade in products, though not a perfect one: licence production normally takes more time than directly importing - i.e., may come too

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[1] See also NATO Information Service, NATO and the Warsaw Pact - Force Comparisons, Brussels 1984, where emphasis is given to severe differences between the alliances regarding transport costs (which are supposedly higher among NATO members). Ibidem, p.4.

[2] For an in-depth analysis of arms trade with the third world, see e.g., Robert W. Clawson, East-Western Rivalry in the Third World. Security Issues and Regional Perspectives. SR, Wilmington (Del.) 1986, or Christopher Coker, NATO, the Warsaw Pact and Africa. Macmillan, London 1985.

late - and it takes more indigenous know-how. The advantage of licence production is on the other hand that the recipient country in the long run becomes less dependent on foreign arms supply. It can be expected that, in periods of actual international conflicts of a country, the short-run demand for military hardware is high relative to the demand for software. Longer lasting periods of peace may give trade in military software a competitive edge. Though one should be cautious to avoid an interpretative overkill, Table 1 would also suggest that:

- the two alliances as well as their member countries (exception: the United States) internally prefer trade with arms licences to trade with arms;
- the less-developed countries prefer weapons imports to the knowledge of how to produce them.

This is reflected in the relationships between the alliances and less-developed countries: both alliances co-operate less with LDCs regarding indigenous arms production than could be expected in view of the volume of arms trade - the FRG is a significant exception to this pattern.

c. Overall Revealed Political Preferences

10. International trade in commodities for which the techniques and costs of production are similar to those of heavy weapons will now be compared with arms trade (Table 2). In cases where the trade patterns of the two are identical, the

Table 2: The Regional Structure of Trade in Machinery and Transport Equipment (SITC 7) in 1985 (in per cent)

Importing Country / Exporting Country	Developed Market Economies					Comecon Europe	Less-Developed Countries	World	Structure of World Supply
	Total	US	France	UK	FRG	Total	Total[b]	Total	
Developed Market Economies									
Total	73.0	23.3	5.6	6.1	6.6	1.8	25.2	100	85.2
US	66.2	-	3.4	6.7	4.8	0.2	33.6	100	15.9
France	67.5	10.3	-	8.4	12.8	1.9	30.6	100	5.5
UK	71.6	17.5	7.2	-	12.2	0.9	27.5	100	5.5
FRG	79.1	14.5	12.3	9.5	-	3.1[a]	17.8	100	14.7
Comecon Europe									
Total	6.6	0.5	0.8	0.5	0.8[a]	82.0	11.4	100	6.5
Less-Developed Countries									
Total	60.5	36.8	2.1	4.8	4.4	5.3	34.2	100	8.3
Structure of World Demand	67.6	22.9	4.6	6.0	6.3	7.3	25.1	100	100

[a] Excluding trade between the two German states. - [b] Including item "unspecified" in the OECD trade statistics.

Source: United Nations, Statistical Office, Monthly Bulletin of Statistics, Vol. XLI, February 1987 and May 1987, New York 1987. - OECD Department of Economics and Statistics, Foreign Trade by Commodities 1985, Exports, Vol. I, and Imports, Vol. II, Paris 1987. - Own calculations.

above discussion and qualifications would imply that there are no apparent policy-induced distortions.

Comparison between Tables 1 and 2 reveals that there are great differences between "civilian" and "military" trade patterns: this holds particularly true for the intra-trade patterns of developed market economies, of Comecon countries, and of less-developed countries[1]. Civilian intra-

[1] The "non-aligned" and the "other" industrial countries of Table 1 are part of the "developed-market" economies of Table 2. The resulting bias regarding the above comparisons is of only little importance, as Table 1 suggests.

trade is about four times as high as the arms intra-trade in the first two regions; in the intra-LDC trade case the opposite is true: the share of civilian intra-trade is but one third of arms intra-trade.

11. RPPs for major conventional weapons are shown in Table 3. They indicate that congruency of trade structures is greater regarding total world supply (last column in Tables 1 and 2) than world demand (last row in Tables 1 and 2).

Table 3: Congruency of World Exports (World Imports) of Arms versus Comparable Civilian Exports (Imports) in 1985: Revealed Political Preferences.

Region / Country	RPP Coefficient[a] Exports	Imports
Developed Market Economies[b]	-0.2	-0.7
US	0.9	-0.9
France	1.7	-1.0
UK	0.5	-0.9
FRG	-0.8	-0.7
Comecon Europe	1.8	-0.6
Less-Developed Countries	0.3	2.1

[a]Ratio of total arms export (import) shares to total exports (imports) of SITC 7 products minus one. - [b]NATO plus non-aligned plus other industrial countries.

Source: Calculated from Tables 1 and 2.

Structural identity would imply that the ratios of military to civil supply (or demand respectively) would be unity and thus RPPs would equal zero. By and large, this is true in the case of supply of developed-market economies, and of LDCs; no such congruency can be identified on the import side; less-developed countries import only a small fraction of what could be expected from civilian imports, and less-developed countries import more than three times as many weapons relative to other countries than non-military goods.

The seemingly high congruency of developed countries' world market shares in military relative to civilian products is, as Table 3 indicates, a statistical artefact: some countries - such as the US, France, and the UK - have a coefficient well above zero; the FRG and, not shown in Table 3, Japan have a very low coefficient - in fact Japan virtually does not export major conventional weapons at all. The median position is hardly represented.

12. The results suggest that political preferences are indeed a dominating feature of internaternational arms trade. The impression comes out quite clearly that arms trade is typically marked by mercantilism: all countries which are leading in arms exports seem to discriminate heavily against foreign suppliers. Secondly, most of the arms exporting countries exhibit a high degree of specialisation in their export basket towards military goods. Thirdly, the index of political preferences indicates that the FRG's (and, not

shown in Table 3, Japan's) arms exports are discriminated against; it does not come out, yet, whether this is a consequence of political self-restraint or part of the preferences of potential customers. Fourthly, less-developed countries exhibit strong political preferences for importing weapons rather than civilian engineering products. Finally, import discrimination as defined above is strong as a rule, and almost perfectly so in the case of France and the US. This raises the question of intra-alliance RPPs.

d. RPPs within NATO

13. It has been said that RPP for intra-alliance trade can be expected to be positive for the simple non-economic reason that mutual trust - should alliances make any sense at all - is greater under alliance conditions than without the alliance. The evidence with respect to some of the larger NATO member states is compiled in Table 4. It shows that

Table 4: RPP Indices[a]: The Case of Selected NATO Member States in 1985

Exporting/Importing Country / Country	US	France[b]	UK	FRG
US	-	- 1	-0.6	-0.6
France[b]	-0.9	-	- 1	-0.9
UK	-0.6	- 1	-	-0.6
FRG	- 1	- 1	-0.7	-

[a]As described in Table 3. - [b] Contracting party to NATO but not part of the integrated military command structure.

Source: Calculated from Tables 1 and 2.

there is no preferential treatment of arms trade among the NATO countries considered. In fact, the negative coefficients indicate almost maximum mutual discrimination[1]. The division of labour in military products is much less developed than even sheer neutrality cum economic interest would suggest.

3. Military Alliances: A Case of Mutual Trust?

14. A remarkable result of the preceding section is the low intensity of arms trade within the two military alliances. This poses the question about the implications which the existence of an alliance has on measured RPP indices of member states. Firstly, the RCA index on which RPP is based should refer to markets not distorted by any kind of government intervention. Since alliances are, by their very existence, an intervention, the question has to be analysed whether there are economic reasons why RCAs can be expected to differ due to the market conditions created by the alliance. Secondly, the a priori assumption would be that since alliances by their very nature reflect preferences among countries, the RPP of arms trade within the alliance should be positive.

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[1] Total maximum discrimination would give, when adding up the coefficients in Table 4, the sum of -12. Actually, the sum is -9.9 (i.e., 83 per cent of maximum discrimination).

15. At a first glance, there is no special risk involved in exporting or importing military goods within a military alliance - this is the very essence of an alliance which rests on mutual trust among member countries, and on collective support in cases of third countries' aggression; trust quite obviously would include non-proliferation of arms and know-how to third parties. Put differently, within an alliance there are no security constraints to the case for internal free trade: each member country's welfare is served best by an allocation of resources which leaves the production of civilian as well as of military goods with the most efficient producer. "Free trade" describes a scenario in which there is competition among buyers and among sellers, and where market performance is not influenced by the production and trade-specific interventions of governments.

16. However, the real world is different[1]. Mutual trust and collective action in favour of endangered partner countries may not be the main underlying forces even within alliances. Countries continue to have their selfish interests and aims. In other words: even as part of an alliance, each country tends to have a national balance sheet where costs and benefits of the alliance are accounted for. Most probably, an alliance will only be stable in the long run if costs and

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[1] Günter Kirchhoff(Hrg.), Handbuch zur Ökonomie der Verteidigungspolitik. Praetoria Verlag, Regensburg, 1986.

benefits for each member stay in equilibrium[1].

17. The crucial question then turns out to be: is there any good reason to assume that the international production and trade structure of military goods (and technologies) within an alliance would be different from those structures which could be expected if only economic criteria of competitiveness were to matter? The economists' profession has long since developed models of thinking which may help to answer this question. One model tries to explain deviations from the "free-trade scenario" by specific structures of supply and demand. When some market agents possess more economic power than others, this will have an impact on the allocation of resources. Of course, this model is not a peculiarity of the arms market; in fact, the same reasoning has been applied with respect to other markets, such as automobiles, steel or chemicals . The second model explains deviations from "free-trade structures" by international political cooperation, i.e., by the cartel-like behaviour of governments concerning the provision of the public good called national security.

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[1] Boulding argues that military alliances as such are basically non-economical, "in the sense that they do not have a balance sheet", which seems to be no contradiction to the above. Kenneth E. Boulding, "The Economics and Noneconomics of the World War Industry". In: Contemporary Policy Issues, Vol IV, No. 4, Oct. 1986, pp. 12-21. See also Kal J. Holsti, "Politics in Command: Foreign Trade as National Security Policy". In: International Organization, Vol. 40, No. 3, Summer 1986, pp. 643-671.

a. RCAs under Conditions of Oligopoly

18. In the first model, NATO can be regarded as resembling either an oligopoly (with few member countries of "medium size"), a partial oligopoly (with some "small" members and few "medium" ones), a partial monopoly (with some "small" members and one "big" one), or an asymmetric partial oligopoly (with some "small", and some "medium" members, and one "big" one)[1]. Most observers would subsume the western alliance under the heading "asymmetric partial oligopoly", where the United States would be the big supplier, the United Kingdom, France, Italy, and West Germany of medium size, and probably countries as Denmark, Luxembourg, or Belgium among the small suppliers. But no matter what the exact definition of the NATO structure may be, the model predicts similar behavioural patterns. Even in the partial-monopoly case, the big supplier cannot achieve his individual profit maximum; he has to take into account what the others would do even if these other parties simply accepted the conditions set by the leading supplier.

The structure/conduct model allows for a variety in market behaviour of the leading supplier. In the extreme case of purely monopolistic behaviour, the monopolist - here the United States is the leading supplier of weapons - tries to charge higher (monopolistic) prices by supplying less quan-

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[1] See Heinrich von Stackelberg, "Die Grundlagen der Nationalökonomie". In: Weltwirtschaftliches Archiv, Vol. 51, 1940 (I), pp. 245-286.

tities compared to the "free-trade" case. Such behaviour would be self-defeating: too high prices would provide the incentives for the smaller countries to take up arms production on their own; in the end, the monopolistic position would have been eroded, resulting in a higher number of arms producers.

19. In reality, at least two conditions necessary for the above scenario do not hold true: firstly, there is no "natural" monopoly of arms production; secondly, theory tells us that a monopolist, like an oligopolist, would not charge prices above the "entry-prevention price"[1] - a price which makes the home productions of potential competitors unattractive, and which is well below the short-run maximum profit level. However, when considering that the technological capability as well as factor endowments, in particular with respect to human capital, is rather similar across industrial countries, then the entry-prevention price should be close to the competitive price, otherwise there would hardly be an entry prevented. It can be concluded, therefore, that the structure/conduct model does not predict a basic divergency regarding the international structure of production and trade between products for military and for civilian purposes.

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[1] Jagdish N. Bhagwati, Oligopoly Theory, Entry Prevention, and Growth.Oxford Economic Papers, Oxford, Vol. 22 (1970), pp. 297-310.

b. RCAs under Conditions of Cartelisation

20. The other model refers to the alliance as a cartel maximising welfare for its members. In such a cartel, decisions are centrally planned, which may result in the closure of inefficient plants and in profit sharing. It may also be that, instead of the most efficient plants, the plants of the biggest cartel members would be treated preferentially. NATO would thus be regarded as an international cartel. In the civilian domain, international cartels fix prices and conditions, agree upon foreign market sharing and leave domestic markets to domestic suppliers[1]. Since NATO is a supplier of security for its members (and for free riders), it has different parameters of action[2]. Let us assume here that its raison d'être is to supply security more cheaply than the member countries themselves could achieve (or, in the same vein, that it has to render more security for a certain amount of money which member states are willing to spend).

21. The ideal of an alliance would provide the public good "external security" common for all its members without discrimination in one way or another. The parameters of action are the quality and level of combined armaments, the common

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1 Corvin D. Edwards, Cartelization in Western Europe. Policy Research Study. External Research Staff, Bureau of Intelligence and Research, US Department of State, Washington D. C., June 1964.

2 Mancur Olson jr. and Richard Leckhauser, "An Economic Theory of Alliances". In: The Review of Economics and Statistics, Vol. XLVIII (1966), pp. 266-279, Todd Sandler, John F. Forbes, "Burden Sharing, Strategy, and the Design of NATO". In: Economic Inquiry, Vol. 18, 1980, pp. 425-444.

military strategies for cases of emergency, and, thirdly, the individual countries' contribution to the common ends. Of course, in the case of the ideal alliance, members do not necessarily have the same weight: if monetary contributions, for instance, differ according to country size one would expect some equivalent distribution in the process of decision-making: even in its ideal form the alliance does not abolish selfish national interests; voting power according to monetary contribution does not settle free-rider problems or disputes over burden sharing. In the formulation of strategies, the US would, e.g., aim at maximum contributions of other NATO countries to support a strategy solely determined by the US as the most important member[1]. If this strategy were "massive nuclear deterrence", however, smaller member countries could exploit their potential of being a free rider. Therefore, the US would have to change her strategy towards, say, some "flexible response" solution where flexibility is provided also by member countries[2], and so on[3].

Having agreed upon the parameters of action, the ideal alliance would buy the inputs necessary for the pursuit of se-

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[1] Michele Fratianni, John Pattison, "The Economics of International Organizations". In: Kyklos, Vol. 35, 1982, pp. 244-262.

[2] Empirical evidence for this has been established by James C. Murdock, Todd Sandler, "Complementarity, Free Riding, and the Military Expenditures of NATO Allies". In: Journal of Public Economics, Vol. 25, No. d/2, Nov. 1984, pp.83-101.

[3] Other strategies of the "big" country can likewise be analysed as having repercussions on the said strategy.

curity from the cheapest sources possible. Again, market structures would not play any decisive rôle, but rather the distribution of human capital (which includes inventive and innovative capability). The production and trade structures would not differ basically from the above described "free-trade" structures.

22. The concept of an ideal alliance is, of course, fiction. National security interests are not identical for all members; the common policy is but a compromise. Furthermore, non-security considerations play a rôle in the formation of national stances. The existence of a "military-industrial complexus" in most countries, for instance, may introduce tendencies towards national autarchy into the alliance; the reason is that the close interrelationship in the public procurement system between customer (administration, and the military) and domestic arms suppliers precludes making full use of the advantages of the international division of labour[1]. In addition, diverging histories, and national traditions of cartel members can lead to a seemingly non-economic use of resources. One such historical instance, or national tradition, can be seen in the differing degrees of self-re-

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[1] Sam C. Sarkesian, The Military-Industrial Complex, a Reassessment. Bev. Hills (Cal.), 1972. For a recent study on West-European Naval Industries and Defence Procurement see S. Faltas, Arms Markets and Armament Policy. M. Nijhoff Publishers, Dordrecht 1986. Cost aspects and efficiency issues of the existence of the military-industrial complex are discussed in William J. Weiden, Frank L.Gertcher, The Political Economy of National Defense. Westview Press, Boulder (Col.) 1987.

straint of exporting countries, or - vice versa - in a traditionally strong arms export orientation of others. In fact, international differentiation regarding prices, quantities, or qualities of products has been one typical feature of international cartels[1].

23. All in all, NATO as an international cartel for the supply of security can be expected to exhibit an international structure of production and trade which deviates from the patterns of the free-trade case. The economic point of view is thus that in two of the cases considered - "free trade" and asymmetric partial oligopoly - the resulting structures of NATO's arms production and trade should not differ much. If they do differ subtantially from the "free trade" case, the reasons can in part be sought in the peculiarities of international cartel formation.

There may, however, be a problem of identification with respect to "political" and "economic" causes for RPP $\neq$ O: Main political arguments are those about the necessity of the security of supply in all matters of national defence (note the famous phrase of Adam Smith about defence being more important than opulence[2]), and about the necessity to support

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1 OECD, Export Cartels. Report of the Committee of Experts on Restrictive Business Pratices. Paris 1974.

2 "The first duty of the sovereign, that of protecting the society from the violence and invasion of other independent societies ..." Adam Smith, An Inquiry into the Nature and Causes of the Wealth of Nations. The Modern Library, New York 1965, p. 653.

technologically-leading sectors such as the military one in order to benefit from spin-offs and to keep up with other countries pursuing similar objectives. At the same time, cartels - especially when producing at high costs - need justification in the public's eyes. Exemptions in national, e.g., German, anti-trust laws which explicitly refer to non-economic welfare illustrate the identification problem.

4. Conclusions

24. Even when allowing for the problems inherent in the comparison between major conventional weapons and products of SITC 7, the results clearly indicate that political preferences and cartel behaviour within alliances play an important rôle: the most striking case of trade inhibiting preferences can be observed within NATO. The international division of labour is, in economic terms, less developed and thus less efficient than it could be. To put it differently: major conventional weapons are more expensive than they could be, or, the supply with civilian goods could be expanded simply by restructuring world arms production and arms trade, without reducing the overall level of world output in arms. This would translate into a rise in world economic welfare.

25. Cartel behaviour apart, a layman in military matters would suppose that political preferences should be least relevant among member states of the same military alliance.

Within a military alliance, one would expect a division of labour which is oriented on efficiency rather than on each members's national autarchy. It is surprising, then, that within NATO (or within the Warsaw Pact) the structures of arms trade indicate a very low level of internal integration. It certainly would be misleading to explain these low levels of internal integration by surmising that the actual arms-trade patterns within NATO (the Warsaw Pact) reflect the comparative technological advantages of the leading country. Such advantages should also show up regarding trade in comparable civilian goods (here: SITC 7) - the measure of congruency should then be near zero. This is not the case.

26. A non-economic explanation differentiates between arms supply (exports) and demand (imports). With respect to engineering products, two of the three major suppliers are Japan and West Germany. Both countries' arms exports are low compared to their potential as measured by comparable civilian exports. Whatever the reason for this export restraint[1], it strongly affects the international structure of arms supply by increasing the world market shares of other suppliers. On the import side, most NATO member countries effectively prefer national arms production to imports - be it for national security reasons, for promoting domestic technological progress, or due to other autarchy-directed tendencies.

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[1] For the motives of West German policies regarding arms exports, see Michael Brzoska, Rüstungsexportpolitik - Lenkung, Kontrolle und Einschränkung bundesdeutscher Rüstungsexporte in die dritte Welt. Arnoldshainer Schriften zur interdisziplinären Ökonomie, Bd. 11, Frankfurt/Main 1986.

Since export restraints have a simultaneous impact on the import structures of other countries, and import restraints affect the export structures of other countries, it is hard to disentangle what causes what in international arms trade. What it does tell us is that, in economic terms, there are severe distortions of international intra-alliance as well as extra-alliance arms-trade patterns.

27. All in all, it may be argued that hypotheses for explaining world arms-trade structures are different according to the region analysed: (1) The structure of world exports by region seems to be strongly influenced by voluntary export restraints of two of the potential biggest suppliers of major conventional weapons besides the US, namely Japan and West Germany. (2) Trade between developed and less-developed countries seemingly follows the trading-with-the-enemy hypothesis because there is no special risk involved for a highly-developed country in exporting arms to most of the less-developed countries. (3) Of course, the more or less non-existent trade between the two major alliances can also be explained by the trading-with-the-enemy hypothesis. (4) Intra-alliance trade may be explained by (a) the security-of-supply argument, or (b) the spin-off argument (which here stands for the internalisation of military R&D results and for all the interactions relevant in the context of the "military-industrial-complexus"); both hypotheses can likewise express genuine political preferences or be the consequence of cartel-like behaviour of member states.