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## The Structure of Common Trade and the Prospects for East-West Exchanges

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CENTER DISCUSSION PAPER NO. 201

THE STRUCTURE OF COMECON TRADE AND THE  
PROSPECTS FOR EAST-WEST EXCHANGES

J. M. Montias

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The Structure of COMECON Trade and the  
Prospects for East-West Exchanges\*

J. M. Montias

This paper deals with fairly narrow but important empirical issues in the commodity trade of the members of the Council for Mutual Economic Assistance (CMEA).<sup>1</sup> It focuses on the division of CMEA members' imports and exports by broad commodity groups and on the shares of CMEA and of the rest of the world in exchanges within each of these groups. With the aid of statistical analysis, we attempt to isolate the chief factors influencing the respective shares of Comecon and of the West in the imports of machinery and of other manufactured goods by each CMEA member. On the basis of the structural characteristics of the direction of trade by commodity groups in the mid-1960's, we conclude by speculating on the long-run effects on East-West trade of continued industrialization in Eastern Europe and of the upsurge in Soviet-American exchanges.

I. Soviet Trade Statistics

The trade data regularly published by CMEA members by and large do not show how imports and exports in each commodity group are divided according to countries of origin or destination. Even in the case of the Soviet Union, which publishes quite detailed statistics of foreign trade, it is not possible to reconstruct this division with any accuracy, in view of substantial gaps in the breakdown of trade with each partner in the published statistics. Considerable progress has been made in the analysis of these gaps and, more generally, in the understanding of Soviet

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\*I am grateful to Dr. Jozef van Brabant who contributed his useful advice and kindly made available to me some of his unpublished data on the direction of CMEA trade by commodity groups and to Mr. Mark Allen for locating recently published Romanian and Bulgarian data that were not available to me.

<sup>1</sup>The members of CMEA are Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Mongolia, Poland, Romania and the U.S.S.R. Insofar as possible, in all the data in this paper referring to CMEA trade prior to 1962, the trade of Albania which was still a member is included, but that of Mongolia, which joined the Council in 1962, is not. From 1962 on, data for Albania are excluded, data for Mongolia included. On some exceptions to this general rule, see the notes and sources to Tables 4 and A1.

trade statistics in Paul Marer's book, Soviet and East European Foreign Trade, 1946-1969, and, still more recently, in a paper written by B. Kostinsky for the U.S. Department of Commerce which will be published later this year.<sup>2</sup> Both Marer and Kostinsky have concluded that the major portion of the gaps consisted in "commercially traded strategic items" (Marer, p. 367). Since the USSR's partners in CMEA, as will presently be shown, do not include Soviet strategic exports in their import statistics in the same group or groups where these items were concealed in Soviet trade statistics, the unraveling of this problem is critical to a cross-country comparison of the relative importance of intra- and extra-Comecon trade in each group. Hitherto unpublished data discovered in a Soviet source generally confirm the earlier analyses of Marer and Kostinsky but also make it possible to narrow further the margin of uncertainty pertaining to the nature of the commodities omitted from the official Soviet foreign-trade annuals.<sup>3</sup>

Table 1 below presents the reconstructed breakdown by commodity groups of the USSR's trade with CMEA partners based primarily on this Soviet source. The gaps shown represent the difference between estimated total trade with CMEA in each group and the sum of the values of the items specified in Soviet foreign-trade annuals in trade with individual CMEA partners.

The gaps in Groups I, III, and V are small and are presumed to fall within the margin of error of the independent calculations. Gaps in

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<sup>2</sup>Barry L. Kostinsky, "Description and Analysis of Soviet Foreign Trade Statistics," Foreign Demographic Analysis Division, Bureau of Economic Analysis, Social and Economic Statistics Administration, U.S. Department of Commerce, February 1974 (draft).

<sup>3</sup>The original Soviet data are presented in Tables A1 and A2 of Appendix A.

Table 1

Soviet Trade with CMEA Members:  
Breakdown by Commodity Groups  
(Millions of U.S. Dollars)  
1960, 1964, 1965, and 1967

I. Industrial Machinery and Equipment (CTN Group 1)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	440	415	25	1184	1209	-25
1964	850	851	-1	2025	2025	-
1965	842	845	-3	2114	2117	-3
1967	1207	1203	4	2187	2186	1

II. Fuels, Mineral Raw Materials, Metals (CTN Group 2)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	1219	1225	-6	584	451	33
1964	1996	1981	15	662	499	163
1965	2012	1975	37	701	569	182
1967	2048	2037	11	629	438	191

Table 1 (continued)

III. Chemicals, Fertilizers, and Rubber (CTN Group 3)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	106	104	2	96	91	5
1964	n.a.	152	n.a.	n.a.	176	n.a.
1965	164	159	5	166	161	3
1967	193	184	9	191	179	12

IV. Raw Materials of Vegetable and Animal Origin (Other than Food)  
(CTN Group 5)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	399	405	-6	130	104	26
1964	504	503	1	169	164	5
1965	538	533	5	152	146	6
1967	549	542	7	170	161	9

V. Foodstuffs and Raw Materials for Foodstuffs (CTN Groups 7-8)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	533	506	27	226	189	37
1964	373	356	17	352	320	32
1965	398	382	16	450	409	41
1967	559	533	26	485	461	24

Table 1 (continued)

VI. Industrial Consumer Goods (other than foodstuffs)  
(CTN Group 9)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	112	75	37	513	512	1
1964	112	104	8	889	870	19
1965	112	101	11	895	884	11
1967	136	129	7	1253	1204	49

VII. Building Materials, Construction Parts, and Unspecified<sup>a</sup>  
(CTN Groups 4 and Residual)

	Exports			Imports		
	Reconstructed from given breakdown	Sum of specified items	Gap	Reconstructed from given breakdown	Sum of specified items	Gap
1960	309	6	303	87	18	69
1964	n.a.	12	n.a.	n.a.	23	n.a.
1965	613	17	596	256	22	234
1967	533	30	503	242	29	213

Total Soviet Trade with CMEA

	Exports			Imports		
	Total Recorded Trade	Sum of specified items	Gap	Total recorded Trade	Sum of specified items	Gap
1960	3118	2736	382	2819	2575	244
1964	4638	3959	679	4508	4077	431
1965	4679	4012	667	4735	4258	477
1967	5225	4658	567	5155	4658	497

Table 1 (continued)

<sup>a</sup>

CTN Group 6, live animals, may also be contained in this residual group, but trade in this category was negligible, except in 1960 when exports to CMEA amounted to \$2.0 million (including Albania). This latter sum was added to the total of specified items for 1960.

Notes and Sources:

CTN Groups are the one-digit categories in the CMEA nomenclature. The reconstructed breakdown of trade by commodity groups is based on the data for 1964 in Table A1 and on the percentages for 1960, 1965, and 1967 in Table A2 of the Appendix. These percentages were applied to total Soviet exports and imports from CMEA computed from Marer (pp. 87, 111) and, for Albania in 1960 and Mongolia thereafter, on Vnesh. Torg. 1959-1963, 1965, and 1967. (Total Soviet exports to CMEA members--in millions of dollars--were 3,118 in 1960, 4,638 in 1964 [Table A1], 4,679 in 1965, and 5,225 in 1967. Total imports from CMEA members were 2,819 in 1960, 4,508 in 1964 [Table A1], 4,735 in 1965, and 5,155 in 1967.) The sums of items specified in the foreign-trade annuals in exchanges with individual countries are taken from Marer (pp. 87, 111) for trade with European members of CMEA other than Albania and are summed from disaggregated data in Vnesh. Torg. 1959-1963 for Albania and from Vnesh. Torg. 1965 and 1967 for Mongolia in 1964, 1965, and 1967.



Groups V and VI are presumed to reflect relatively minor omissions in coverage.<sup>4</sup> The import gap in Group II (CTN 2) is large (nearly one-third of imports in this group in 1967). A plausible hypothesis for this gap is that it consists mainly or exclusively of imports of uranium ores from Eastern Europe.<sup>5</sup>

The largest gaps are to be found in Group VII, which is essentially a residual category. It contains building materials (CTN Group 4), trade in which is small and almost completely itemized in the Soviet foreign-trade annuals (see Marer, p. 367), possibly Group 6, which is negligible in the years 1964 to 1967, and unspecified items not entered in the published CTN nomenclature. The gaps in both imports and exports appear to consist almost entirely of such items. A plausible hypothesis is that this residual category represents arms and other manufactured military goods.

It is noteworthy that the gaps in Group VII on the side of Soviet imports come quite close, for all the years covered in Table 1, to the unspecified residuals in total Soviet imports computed by Marer (e.g.

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<sup>4</sup> Romania, for instance, exported large quantities of meat to the USSR in the mid-1960's, which were not itemized in Soviet statistics.

<sup>5</sup> According to Kostinsky's study (Department of Commerce), Czechoslovak exports of uranium ores to the Soviet Union in 1967 were about 63 million rubles or \$70 million (pp. 169-170).

\$213 million in 1967 compared to Marer's residual for the year of \$222 million).<sup>6</sup> On the export side, on the other hand, the gaps come to only 50 to 60 percent of Marer's computed residuals (\$503 million in 1967 as against Marer's \$1,091 million). This is consistent with the hypothesis that both the gaps and the residual represent trade in arms. Since the Soviet Union probably imports no arms from outside CMEA but sells large amounts to less developed countries outside the bloc, one would expect the CMEA gap to be appreciably smaller than the world residual.

Where do East European importers of Soviet arms conceal these imports in their foreign-trade statistics? One way may be to omit these imports altogether from published trade statistics. The German Democratic Republic's imports from the Soviet Union fell short of Soviet exports to the GDR by \$94 million in 1960, \$174 million in 1964 and \$158 million in 1965. These discrepancies are reasonably close to the estimates of the GDR's arms imports from the Soviet Union and Eastern Europe prepared by the U. S. Arms Control and Disarmament Agency (\$113 million in 1961, \$155 million in 1964, and \$148 million in 1965).<sup>7</sup> The trade gap, however, virtually closed in 1967, which may indicate that the GDR aligned its statistical reporting in this respect with the rest of CMEA in that

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<sup>6</sup>Marer, p. 368.

<sup>7</sup>Cited in Kostinsky, U. S. Department of Commerce, p. 100.

year. In the case of Bulgaria and Romania, Table 2 below suggests that arms imports and exports are included in the machinery and equipment group. The excess of Bulgarian imports of machinery and equipment in 1966 (\$24 million) is somewhat larger than the U.S.A.C.D.A.'s estimate of Bulgaria's arms imports in that year (\$17 million), as is the excess for Romania (\$80 million in the table against \$69 million estimated by the U.S.A.C.D.A.).<sup>8</sup>

There is no obvious explanation for the large discrepancies between Soviet imports and Romanian exports in CTN Broad Divisions II and IV, which appear partly to offset each other. It may be that the Romanian statistics treat as finished consumer goods some items that are considered raw materials or semifabricates by the Soviets. That other members of CMEA besides Bulgaria and Romania include Soviet arms imports in the CTN machinery and equipment group emerges from a comparison of total imports by all CMEA members with total exports from CMEA members in this category. These two totals should of course be equal if all members of CMEA classified their trade in machinery, equipment and arms in precisely the same way. The excess of total CMEA imports over total CMEA exports in the machinery and equipment category, however, is estimated at approximately

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<sup>8</sup> As cited in Kostinsky, U.S. Department of Commerce, p. 100. The estimates in this source are given in rubles. They have been translated into U.S. dollars at the official exchange rate. In 1972, the discrepancy between Soviet exports to Romania and Romanian exports from the USSR in the machinery and equipment group increased to \$110.4 million, or 2.5 times as much as the U.S.A.C.D.A. estimate of total Romanian imports of arms in 1971 (Vnesh. Torg. 1972 and Romanian Press Survey No. 961, 1973, p. 10). The Agency's

Table 2

Discrepancies in Mirror Trade by Commodity Groups  
for Bulgaria (1966) and Romania (1965)  
(Millions of U.S. Dollars)

	CTN Broad Divisions	I	II	III	IV	Unspecified	Total
Soviet exports to Bulgaria (1966)		320	321	11	18	28	697
Bulgarian imports from the USSR (1966)		344	332	12	18	--	707
Excess of Bulgarian imports		24	11	1	--	-28	10
Soviet imports from Bulgaria (1966)		191	87	228	144	5	65
Bulgarian exports to the USSR (1966)		199	90	232	143	--	66
Excess of Bulgarian exports		8	3	4	-1	-5	10
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Soviet exports to Romania (1965)		80	241	2	11	69	403
Romanian imports from the USSR (1965)		158	214	2	33	--	406
Excess of Romanian imports		78	-27	--	22	-69	3
Soviet imports from Romania (1965)		81	205	52	88	15	441
Romanian exports to the USSR (1965)		80	171	60	128	--	438
Excess of Romanian exports		-1	34	8	40	-15	-3

Table 2 (continued)

NOTES: CTN broad divisions are defined as follows: Division I, machinery and equipment; Division II, fuels, mineral raw materials, and metals; Division III, foodstuffs and raw material for foodstuffs; Division IV, industrial consumer goods (other than food).

Slight discrepancies in the totals are due to rounding errors.

Sources: The commodity breakdowns of Soviet exports to and imports from Bulgaria and Romania are calculated from Vnesh. Torg. 1965, Vnesh. Torg, 1967, and Vnesh. Torg. 1918-1966. The Bulgarian statistics are reconstructed from a percentage of Bulgarian trade with the USSR in Popisakov, p. 95. The Romanian data are from Romanian Press Survey No. 961, 1973, p. 10.

\$156 million in 1960, \$188 million in 1964, \$168 million in 1965, and \$311 million in 1967.<sup>9</sup> The large increase from 1965 to 1967, which appears out of line with the decline in the gap attributed to Soviet arms exports (\$503 million in 1967 as against \$596 million in 1965) may be due to the GDR's inclusion of Soviet arms imports in its statistics starting in 1967. It may be inferred from the fact that the difference in the totals is appreciably smaller for all four years than the gaps in Group VII of Table 1 that some CMEA members conceal their imports of Soviet arms in other CTN categories. For example, according to Kostinsky (U.S. Department of Commerce, pp. 168-169), Czechoslovakia combined arms imports from the Soviet Union with ores and metals imports in 1967.

In order to compute the division between CMEA and non-CMEA Soviet trade by commodity groups, the following assumptions have been made in accord with the above hypotheses on exports and imports of military goods.

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estimates appear to be seriously understated for recent years (see Kostinsky, U.S. Department of Commerce, p. 101). It may be noted in passing that a new gap has opened up in CTN Broad Division II on the Soviet import side. Instead of an excess of Soviet imports in this category over Romanian exports, as shown in Table 3, there was an excess of Romanian exports over Soviet imports of \$66.4 million.

<sup>9</sup>Intra-CMEA imports and exports of machinery and equipment by the USSR, Bulgaria, Czechoslovakia, GDR, Hungary, and Poland are computed from Appendix Tables A1 and A2. Romania's trade in machinery and equipment with CMEA in 1960, 1964, and 1965 is from Montias (1967). For 1967, the corresponding data are computed from Chamber of Commerce of the Socialist Republic of Romania, 1969, pp. 142-143, on the assumption that the ratio of imports from and exports to CMEA bore the same relation to imports from and exports to all "socialist countries" as in 1965. It was assumed that 95 percent of Mongolia's imports of machinery and equipment came from the USSR in all four years. Albania's imports from those CMEA members which included Albania in their export totals to CMEA were very roughly estimated at \$33 million in 1960 and \$15 million in 1964, 1965, and 1967. Thus, total exports of machinery and equipment by CMEA members to CMEA partners (in millions of U.S. dollars) came to 2,493 in 1960, 4,358 in 1964, 4,653 in 1965, and 5,409 in 1967. Total imports in this category by CMEA members from CMEA partners (also in millions of U.S. dollars) came to 2,649 in 1960, 4,546 in 1964, 4,821 in 1965, and 5,720 in 1967.

- 1) Total Soviet exports to and imports from the entire world have been broken down into the seven groups of Table 1 on the assumption that the overall residuals computed by Marer could be assigned entirely to trade in arms.
- 2) It is assumed that the breakdown of CMEA trade reconstructed from Zhukov and O'lsevich in Table 1 is complete for all seven groups.
- 3) An eighth group presumed to consist of exports and imports of arms has been constructed from the gaps in Group VII and Marer's overall residual. The results are shown in Table 3.

Soviet trade in manufactures (other than foodstuffs) may be estimated by summing CTN Groups 1 (machinery and equipment), 3 (chemicals), 4 (building materials) and 9 (industrial consumer goods), and adding the special group presumably consisting of arms or other manufactured military goods.<sup>10</sup> With the world as a whole in 1967, the Soviet Union had a deficit of \$1,583 million in manufactured goods, which was the resultant of a heavy deficit with CMEA, equal to \$1,805 million, and a moderate surplus with the rest of the world equal to \$222 million. This surplus was presumably earned chiefly by selling manufactured goods and arms to developing countries and to non-CMEA socialist countries (most of which were also underdeveloped). (If the special group is excluded from this reckoning, the surplus in trade in manufactures with the rest of the world turns into a deficit of \$357 million.) In this same year, CMEA partners accounted for 54 percent of Soviet exports and 72 percent

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<sup>10</sup> This definition of manufactures differs from that used in Appendix B wherein estimated metals exports have been added to the groups cited above.

Table 3

Soviet Trade with CMEA and non-CMEA Partners  
by Commodity Groups (1960, 1965, and 1967)  
(Millions of U.S. Dollars)

CTN Group	<u>EXPORTS</u>								
	1960			1965			1967		
	CMEA	non-CMEA	T o p a r t n e r s i n : non-World	CMEA	non-CMEA	World	CMEA	non-CMEA	World
1	440	701	1141	842	792	1635	1206	830	2037
2	1219	850	2069	2012	1225	3237	2048	1417	3465
3	106	89	195	164	130	294	193	193	386
4	6	11	17	17	24	41	30	18	48
5	399	391	790	538	582	1120	549	687	1236
6-8	533	196	729	398	289	687	559	580	1139
9	112	49	161	112	84	196	136	115	251
Special group (arms)	<u>303</u>	<u>159</u>	<u>462</u>	<u>596</u>	<u>369</u>	<u>965</u>	<u>503</u>	<u>589</u>	<u>1091</u>
Total	3118	2446	5564	4679	3496	8175	5225	4427	9652



Table 3 (continued)

CTN Group	IMPORTS								
	1960			1965			1967		
	From partners in:								
	CMEA	non-CMEA	World	CMEA	non-CMEA	World	CMEA	non-CMEA	World
1	1184	493	1677	2114	577	2691	2187	733	2920
2	584	609	1193	701	306	1007	629	319	948
3	96	242	338	166	334	500	191	330	521
4	18	27	45	22	26	48	29	31	60
5	130	523	653	152	654	806	170	675	845
6-8	226	455	681	450	1178	1628	485	864	1349
9	513	455	968	895	249	1144	1253	420	1673
Special group (arms)	69	4	73	234	--	234	213	9	222
Total	2819	2809	5628	4735	3323	8058	5155	3382	8537

Note: CTN Groups are defined in the headings of Table 1. Exports to and imports from CMEA partners are from Table 1. Trade with the world is calculated from Marer, pp. 24, 34, 368.

Small discrepancies between the sum of components and totals are due to rounding errors.

of imports in the manufactured groups (including arms). In raw materials and foodstuffs (all other groups but those assigned to manufactures), the Soviet Union in 1967 had a surplus with both CMEA and non-CMEA partners (\$1,875 million and \$823 million respectively). It was of course possible for the Soviet Union to run surpluses both in manufactures and raw materials with the "rest of the world" as a consequence of large credits to developing and "other socialist" countries, which are reflected in an overall surplus of about \$1.2 billion with these two areas. Finally it may be noted that Comecon partners absorbed 54 percent of Soviet exports but supplied only 41 percent of Soviet imports of raw materials and foodstuffs according to these calculations.

## II. The Commodity Composition of Intra-CMEA Trade

The commodity structure of the trade of the Soviet Union and of its East European allies is summarized in the percentages in Table 4 below. Two percentages are shown under each commodity group heading. The first, marked S, expresses the share of the group in the trade of a given country with the entire world. (Except for rounding errors, the sum of these percentages across the table should add up to 100.) The second, marked C, is an estimate of the shares of intra-CMEA trade as a percentage of trade with the entire world in this group.

Table 4

Percentage Breakdown of Total Exports and Imports by  
CTN Commodity Groups (S) and Share of CMEA in  
Trade within Each Group (C)  
(1967)

CTN Group	E X P O R T S													
	1		2		3		4		5		6-8		9	
	S	C	S	C	S	C	S	C	S	C	S	C	S	C
USSR	32.7	54.6	35.9	57.5	4.0	50.0	0.6	62.5	12.8	44.4	11.8	49.1	2.6	54.2
Bulgaria	25.5	92.2	7.2	42.1	2.7	56.1	1.1	83.3	11.5	68.5	37.2	66.7	14.8	85.2
Czechoslovakia	48.6	77.2	17.9	62.4	4.3	66.2	1.7	55.6	4.7	24.0	34.5	21.8	18.4	60.9
German Democratic Republic	49.3	81.8	26.9 <sup>a</sup>	60.2 <sup>a</sup>	-- <sup>a</sup>	-- <sup>a</sup>	-- <sup>a</sup>	-- <sup>a</sup>	-- <sup>a</sup>	-- <sup>a</sup>	4.3	6.7	19.5	66.6
Hungary <sup>b</sup>	32.7	86.6	14.5	59.4	3.5	59.4	0.9	70.3	5.1	28.8	22.1	50.0	21.3	66.5
Poland	36.1	81.2	23.7	60.2	3.9	39.6	1.0	31.4	4.4	15.1	15.5	16.6	15.4	70.2
Romania	19.0	74.8 <sup>d</sup>	20.5	63.5 <sup>d</sup>	6.0	52.7 <sup>d</sup>	2.7	85.5 <sup>d</sup>	12.9	44.1 <sup>d</sup>	27.9	30.9 <sup>d</sup>	11.1	86.6 <sup>d</sup>
	I M P O R T S													
	1		2		3		4		5		6-8		9	
	S	C	S	C	S	C	S	C	S	C	S	C	S	C
USSR	46.6	76.4	12.2	66.4	3.7	36.7	0.5	48.3	3.3	20.1	9.4	36.0	24.3	74.9
Bulgaria	49.0	80.3	24.1	76.8	7.9	48.2	0.8	75.6	8.7	46.0	5.0	33.3	4.6	72.0
Czechoslovakia	30.6	77.8	25.6	81.3	8.0	45.9	1.1	80.8	12.8	35.0	16.4	64.1	5.5	66.1
German Democratic Republic <sup>b</sup>	15.0	80.9	44.2	72.5	17.3 <sup>c</sup>	70.6 <sup>c</sup>	-- <sup>c</sup>	-- <sup>c</sup>	-- <sup>c</sup>	-- <sup>c</sup>	20.5	44.2	3.0	77.1
Hungary <sup>b</sup>	28.1	80.0	27.5	76.1	10.0	45.4	1.1	63.2	18.4	41.2	9.6	32.7	5.3	68.4
Poland	37.0	75.2	25.2	71.4	8.1	38.8	0.7	43.5	12.5	31.8	10.9	47.0	5.6	77.8
Romania	48.8	39.9	24.9	70.2 <sup>d</sup>	6.5	33.9 <sup>b,d</sup>	1.3	68.2 <sup>b,d</sup>	8.9	25.4 <sup>b,d</sup>	2.8	61.9 <sup>b,d</sup>	6.9	57.4 <sup>d</sup>

<sup>a</sup>Groups 2 to 5 have been combined and are shown under Group 2.

<sup>b</sup>1965.

<sup>c</sup>Groups 3 to 5 have been combined and are shown under Group 3.

<sup>d</sup>Trade with CMEA and other socialist countries including Yugoslavia.

Table 4 (continued)

Notes:

CTN groups are defined in the notes to Table 1.

For the Soviet Union, the percentage breakdowns of exports and imports are computed from data in Table 3 (arms have been combined with machinery and equipment to enhance comparability with the statistics of other CMEA members). For the remaining countries, the percentages are derived from Marer, pp. 45-50, 54-59. The share of CMEA partners in exports and imports, for all countries except Romania, was calculated from the percentages in Table A2 in the Appendix, which were applied to total exports to and imports from CMEA members, where the membership of the organization was defined to include Albania for Bulgaria, Czechoslovakia, Hungary, and Poland, as the totals in Table A1 for 1964 suggest may have been the practice in that earlier year.

For Romania, imports and exports of machinery are calculated from percentages in Polens Gegenwart, No. 8, 1969, p. 33, as cited in van Brabant's unpublished notes; exports to socialist countries in all but the machinery group and imports from socialist countries of raw materials and metals and of manufactured consumer goods were estimated from percentages given in Romania socialistă și cooperarea internațională, pp. 209-211. Imports of chemicals, construction materials, and animal and vegetable raw materials from socialist countries in 1965 were estimated by subtracting from total imports in each of these groups imports from "developed capitalist nations" and from developing countries, the first based on an exhaustive percentage breakdown in Romania socialistă și cooperarea internațională (p. 243) and the second on Romanian Economic News, June 1971, p. 3. Imports of foodstuffs from socialist countries in 1965 were derived as a residual.

The data in Table 4 show that the percentage of total exports consisting of machinery and equipment tends generally to increase with the level of development achieved by a CMEA member, as does the share of industrial consumer goods.<sup>11</sup> The USSR and Hungary were somewhat exceptional in that the proportion of consumer goods in total exports was relatively smaller than expected in the former and larger in the latter. The share of CMEA partners in total exports and imports of both machinery and consumer goods tended to be very high, although in the case of the share of CMEA in Soviet exports and in Romanian imports, these shares were distinctly smaller than for the other countries listed. (Romania was exceptional in that it bought appreciably less than half its machinery imports and only 57 percent of its imports of consumer goods from socialist countries in 1967.)

The groups showing the smallest share of intra-CMEA trade were CTN 5 (non-food raw materials of agricultural origin) and CTN 6-8 (raw and processed foodstuffs). The CMEA members listed in the table bought two-thirds or more of their imports of raw materials and metals from the bloc but on the average sold only a little more than half of exports in this group to the bloc (Bulgaria only 42 percent).

These percentages for 1967 are now somewhat out of date, but a similar table if it could be drawn up for the early 1970's would probably not exhibit any dramatic change. The data in Table 5 indicate, for instance, that all CMEA members remained extremely dependent on the CMEA market as an

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<sup>11</sup>For more statistical evidence on this relationship, see Appendix B.

Table 5

Shares of CMEA in Exports and Imports of  
Machinery and Equipment by Individual CMEA Members  
(Total exports or imports of machinery and equipment = 100)

	1967		1969		1971	
	X	M	X	M	X	M
USSR <sup>a</sup>	59.3	75.0	55.3	69.2	58.7	n.a.
Bulgaria	92.2	80.3	88.0	87.6	91.4	n.a.
Czechoslovakia	77.2	77.8	74.6	72.7	78.2 <sup>b</sup>	72.5 <sup>b</sup>
GDR	81.8	80.9	80.7	80.2	81.2	n.a.
Hungary	88.1	76.1	91.2 <sup>c</sup>	85.3	83.3	n.a.
Poland	81.2	75.2	78.9	73.1	78.2	n.a.
Romania	70.0	39.9	65.6	51.8	66.2	n.a.

<sup>a</sup>Machinery and equipment only, exclusive of arms.

<sup>b</sup>1972.

<sup>c</sup>The calculated share was 86.7 percent on basis of the statistics published in the U.N. Bulletin of Statistics on World Trade in Engineering Products 1969 (1971).

Notes:

For 1967, see the notes to Table 4 above. The percentages for the Soviet Union (exclusive of arms) were computed from data in Table 1 and in Marer, pp. 44, 53. For 1969, all percentages are based on P. Božik (1973), p. 15. For 1971, all percentages except for Hungary are based on preliminary data in Zycie gospodarcze, April 9, 1972, first cited by Michael Kaser in Problems of Communism, July-August, 1973, p. 9. These percentages were applied to the value of total exports to CMEA of each country, as given in its official statistical yearbook. For Hungary, the share is based on United Nations, Bulletin of Statistics on World Trade in Engineering Products 1971 (1973), p. 147. Czechoslovakia's machinery exchanges with CMEA in 1972 were published in Czechoslovak Foreign Trade, No. 9, 1973, p. 3.

outlet for their machinery and equipment. On the import side, for which we have precise data only for 1969, it would appear that the CMEA shares also remained very high. The CMEA share of Romanian imports increased significantly in recent years, from a low point of 40 percent in 1957 to 52 percent in 1969 and a tentatively estimated 57 percent in 1970.

The trade of individual CMEA members by commodity groups has so far been divided between trade with Comecon partners and the rest of the world. It is instructive, however, to separate out the trade of East European nations with the Soviet Union from their exchanges with other CMEA partners, in view of the special role that the Soviet Union plays in the bloc as a primary source of raw materials and as a dominant market for manufactures. At least in the mid-1960's, the period for which the relevant statistics are available, the Soviet Union was exceptional in that it did not insist, or insisted to a much smaller extent than other CMEA members, on bilateral balancing by broad commodity groups (machinery against machinery, manufactures against manufactures, and so forth). The Soviets' willingness to trade raw materials and foodstuffs ("hard goods") for manufactures ("soft goods") no doubt helped to raise intra-Comecon trade to much higher levels than if they had behaved in the same manner as other CMEA members did. This difference in the degree of bilateral balancing by commodity groups emerges clearly from a comparison of "irreciprocity indexes" by commodity groups. The irreciprocity index (I) for each country in the sample is calculated according to the following formula:<sup>12</sup>

$$I = \frac{\sum_{i=1}^R |X_i - M_i|}{\sum_{i=1}^R (X_i + M_i)}$$

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<sup>12</sup>Frederic Pryor, pp. 190-191. For a discussion of these indexes, see J. van Brabant, pp. 156-183. van Brabant's calculations for 1950, 1955, 1960, and 1965 (pp. 165-67) show results similar to those shown in Table 6 below.

where  $X_i$  and  $M_i$  are respectively exports and imports in commodity group  $i$ , and  $r$  is the number of commodity groups into which exports and imports are divided. The numerator of the formula expresses the sum of the absolute values of the differences between exports and imports within each group; the denominator is equal to the sum of total exports plus total imports.

The indexes range between 0, denoting "full reciprocity" (exports equal imports in each commodity group), to 1, denoting "complete irreciprocity" (if exports are positive in a group then imports are zero and conversely). The indexes are calculated for trade statistics divided into four groups: Group I is identical with CTN Group 1 (machinery and equipment); Group II includes CTN Groups 2, 3, 4, and 5 (raw materials, fuels, metals, chemicals and building materials); Group III includes CTN Groups 6, 7 and 8 (raw and processed foodstuffs); Group IV is identical with CTN Group 9 (industrial consumer goods).

Table 6

Irreciprocity Indexes of East European CMEA Members in  
Trade with the Soviet Union, Other CMEA Partners and the  
Rest of the World  
(Mid-1960's)

	T r a d e     w i t h :		
	USSR	CMEA (excluding USSR)	Rest of the World
Bulgaria (1966)	0.53	0.31 <sup>a</sup>	0.40
Czechoslovakia (1967)	0.55	0.13	0.25
GDR (1965)	0.73	0.34	0.30
Hungary (1965)	0.49	0.22	0.32
Poland (1965)	0.29	0.17	0.19
Romania (1965)	0.33	0.15	0.30

<sup>a</sup>Socialist countries excluding USSR

Source: Appendix C



In all cases, the irreciprocity indexes are higher in trade with the Soviet Union than with CMEA (excluding the USSR) and with the rest of the world, in keeping with the Soviet Union's role as supplier of raw materials and semifabricates and as a market for manufactures. With the exception of the GDR, the indexes are smaller for trade with CMEA than with the rest of the world, a reflection of the bilateral balancing by commodity groups that takes place in mutual exchanges among East European countries.<sup>13</sup>

When the irreciprocity indexes in trade with the Soviet Union are computed for two groups only (machinery and industrial consumer goods in one group and all other goods consisting mainly of raw materials, foodstuffs and semifabricated products on the other), the above results are generally confirmed, except in the case of the Bulgarian and Romanian indexes, the trade of these two countries with the USSR being almost perfectly balanced in each of the two groups. The explanation is this: in the four-group disaggregation, the imbalance is due to exchanges of Bulgarian and Romanian consumer goods against Soviet machinery and equipment; when these two groups are aggregated, bilateral trade in manufactured products gets to be very nearly balanced. Aggregation into two groups obscures the crucial role that the Soviet Union plays as a market for middling-quality consumer goods produced by the less developed countries of CMEA.

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<sup>13</sup> For an unequivocal statement confirming existence of a policy of bilateral balancing on the part of the less developed countries of Comecon, see Savov (1966, p. 19). See also Ausch (1972, pp. 111-113).

### III. Some Hypotheses on the Direction of CMEA Trade in Manufactures

Little is known about the criteria or methods according to which foreign-trade officials in Eastern Europe divide their imports of manufactures between CMEA and Western sources. For several members of the bloc, including particularly the GDR and Bulgaria, loyalty to the Soviet Union, to Comecon, or to both must influence these decisions. For Romania, on the other hand, it may well be that enlightened self-interest is the only guide to the choice of suppliers. But, for all members, it is evident that the ability to generate hard currencies must have something to do with the decision to import from advanced capitalist countries. Hard currency credits represent one source of purchasing power in the West. Another consists of "hard goods"--raw materials, semifabricated goods--that are readily saleable on Western markets. A country's potential earnings of hard currencies will then in part be determined by its surplus in hard goods with the world as a whole. When this surplus increases (or the deficit in hard goods decreases), a CMEA member is capable, if it wishes, to sell more hard goods to and buy more manufactured goods from "advanced capitalist states" than would otherwise be possible. But it may feel its loyalty to Comecon hinders it from taking advantage of this opportunity.

These arguments suggest the following hypotheses.<sup>14</sup> The percentage share of machinery and equipment or of finished manufactures (machinery plus industrial consumer goods) varies positively with 1) Western credits and net earnings in the West from tourism and other services, 2) the difference

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<sup>14</sup>These hypotheses were first developed, but not statistically tested, in Montias (1967), pp. 235-246.

between total exports and total imports of hard goods in trade with the entire world, 3) loyalty to the Soviet bloc.

Neither Western credits to the Soviet Union and Eastern Europe nor earnings from Western tourism can be estimated directly with any degree of precision, but as a reasonable proxy for these accruals we may resort to the total deficit in merchandise trade with developed market economies of individual CMEA members. Loyalty to the Soviet Union and to CMEA cannot be measured directly. To capture this proclivity, a dummy variable has been introduced for each member of CMEA except the Soviet Union. The higher the coefficient estimated for the dummy variable associated with a given country, the greater the use this country apparently makes of its opportunities to earn hard currencies to increase the share of the West in its imports of manufactures, hence the lower its presumed attachment to the Soviet Union and to CMEA.

The regression equation has the following form:

$$S_I = C + \sum_{i=1}^8 \beta_i X_i$$

where  $S_I$  is the share of imports of manufactures (limited to machinery and industrial consumer goods) imported from outside CMEA,  $C$  is a constant (intercept),  $X_1$  stands for surplus in trade in "hard goods" with the entire world,  $X_2$  for trade deficit (-) or surplus (+) with developed market economies,  $X_3$  is the dummy for Bulgaria,  $X_4$  for Czechoslovakia,  $X_5$  for the GDR,  $X_6$  for Hungary,  $X_7$  for Poland, and  $X_8$  for Romania.  $\beta_1$  to  $\beta_8$  are the coefficients of the variables. The observations are drawn from all the countries listed

as dummy variables plus the Soviet Union. A separate regression was run with Yugoslavia included as an eighth country of observation (and as a separate dummy). The hypothesis here is that Yugoslavia should behave like members of the Soviet bloc with respect to the main variables (overall surplus in hard goods, deficit in commodity trade with developed market economies) but should evince no particular loyalty to Comecon, an organization to which it only belongs as an "observer."

To increase the number of observations, data for six years--1964 to 1969--were pooled in the regressions.<sup>15</sup> The regressions were also run with a separate time trend. The pooling of time-series and cross-section data is justified on the assumption that loyalty to the bloc on the part of individual CMEA members, if it changed at all during this brief period, changed in the same direction and at the same rate for all members. This assumption is not entirely realistic, but the failure to satisfy it precisely should not entail any important error.

It should be noted that the influence of the explanatory variables on the dependent variable (the non-CMEA share of imported manufactures) is not predetermined by the specification of the equation. An increase in the total surplus of hard goods (or a reduction in the deficit in these categories) need not be associated with an increase in the share of manufactures imported from the West. Likewise, if credits made available by

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<sup>15</sup> Most of the observations for  $S_T$  for the years 1966 and 1968 had to be estimated with the aid of data on O.E.C.D. exports of manufactures to CMEA on the assumption that these exports bore the same relation to CMEA members' imports from countries other than CMEA in the missing years as they did, on the average, in 1965 and 1967 (for 1966) and in 1967 and 1969 (for 1968). For the GDR, the years 1962 and 1963 had to be substituted for 1966 and 1968, due to the absence of data on the commodity composition of trade for these latter years.

Western countries were used to buy raw materials and semifabricates rather than machinery or consumer goods, they would have no impact whatever on the non-CMEA share of imports of manufactures.

The results of the regressions are shown in Table 7 below.

Table 7  
Factors Influencing the Share of Imported Manufactures  
Originating Outside CMEA  
(1964 to 1969)

Coefficients of Least-Squares Regressions and t-Statistics				
	Regression excludes Yugoslavia, no time trend	Regression includes Yugoslavia, no time trend	Regression excludes Yugoslavia, includes time trend	Regression includes Yugoslavia, and time trend
Intercept (C)	8.78 (1.70*)	6.99 (1.38+)	9.60 (2.01*)	8.58 (1.86*)
Surplus in hard goods ( $\beta_1$ )	.0052 (2.53*)	.0056 (2.76*)	.0035 (1.79*)	.0036 (1.87*)
Deficit (-) with developed market economies ( $\beta_2$ )	-.027 (-3.52*)	-.034 (-4.86*)	-.025 (-3.46*)	-.028 (-4.39*)
Country dummies:				
Bulgaria ( $\beta_3$ )	6.49 (1.30)	7.73 (1.56+)	2.91 (0.61)	3.26 (0.70)
Czechoslovakia ( $\beta_4$ )	17.90 (2.63*)	19.78 (2.94*)	12.74 (1.95*)	13.31 (2.08*)
GDR ( $\beta_5$ )	22.41 (2.94*)	24.66 (3.27*)	17.89 (2.48*)	18.76 (2.67*)
Hungary ( $\beta_6$ )	14.89 (2.53*)	16.54 (2.85*)	10.53 (1.87*)	11.04 (2.00*)
Poland ( $\beta_7$ )	15.60 (2.64*)	17.41 (2.99*)	11.23 (1.98*)	11.83 (2.14*)
Romania ( $\beta_8$ )	31.89 (6.90*)	32.52 (7.06*)	28.69 (6.50*)	28.73 (6.64*)
Yugoslavia ( $\beta_9$ )	---	45.02 (8.52*)	---	41.51 (8.48*)
Time trend	---	---	0.89 (2.75*)	0.996 (3.28*)
R <sup>2</sup>	0.83	0.94	0.86	0.95
Number of observa- tions	42	48	42	48

Note: t-statistics are shown in parentheses after the regression coefficients to which they correspond. An asterisk after a t-statistic indicates that the coefficient is significantly different from zero at the 95 percent confidence level; a cross indicates a 90 percent confidence level. For all countries in the sample excluding the GDR, the data pertain to the years 1964 to 1969. For the GDR, the data are for 1962 to 1965, 1967, and 1969.

Sources: Share of manufactures: For 1964, 1965, and 1967, data in Tables 1, A1, A2. For 1969, Božik (1973), p. 16. Intrapolations for 1966 and 1968 are based on OECD exports of manufactures to CMEA members in Marer, pp. 256-268. All other data are from Marer, pp. 24-59.

The data in Table 7 confirm our hypotheses. An increase in the overall surplus (or a decrease in the deficit) in hard goods and an increased deficit in commodity trade with developed market economies do have a significant effect in raising the share of imports of manufactures originating outside CMEA, whether or not a time trend is included in the regression. Other things equal, with the time trend included, an increase of \$100 million in the overall hard goods surplus (or a comparable reduction in the deficit in hard goods) is associated with an increase of approximately 0.35 percentage points in the share of manufactured imports originating outside CMEA. An increase in the deficit in trade with advanced market economies of \$100 million is associated with an increase of 2.8 percentage points in the dependent variable when Yugoslavia is included and of 2.5 percentage points when it is excluded.

Judging from the coefficients of the dummy variables for Romania in all regressions and for Yugoslavia in the two regressions where it has been included, it is evident that both these countries imported a much larger share of manufactures from outside CMEA in the late 1960's than one would have expected from their surpluses in hard goods and their deficits in trade with developed market economies. Their proclivity to trade with CMEA is the least in Eastern Europe, as we might have anticipated from their recent political-economic history.

It is probably significant that Bulgaria behaved most like the Soviet

Union--i.e., exhibited the greatest loyalty to the CMEA--in that it imported a smaller share of its manufactures from outside the bloc than one would have expected from the surpluses of hard goods it was able to generate and from its touristic earnings and credits from the West. Czechoslovakia, the GDR, Hungary, and Poland were in an intermediate position between Bulgaria and the Soviet Union, on the one hand, and Romania and Yugoslavia, on the other. Differences in coefficients among these four intermediate countries should be interpreted with caution. The GDR dummy appeared high enough, nevertheless, to contradict the view that the East Germans were more closely tied to CMEA than other members. This contradiction may be explained by the fact that the GDR was the most successful exporter within CMEA of manufactured goods to developed market economies and, hence, that it was less dependent on surpluses in hard goods and on credits to obtain hard currencies than its fellow members.<sup>16</sup>

The significant time trend indicates that the share of the West in CMEA imports of manufactures, if all other factors could be held constant, would have risen by nearly one percentage point per year from 1964 to 1969. This suggests a gradual decline in the proclivity of CMEA members to import manufactures from each other, the roots of which must be searched for in the political-economic relations among the countries of the area.

#### IV. Conclusions and Prospects

We have sought to throw light on the structural forces influencing the direction of CMEA members' trade by commodity groups in the mid- to late

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<sup>16</sup>In 1970, out of total GDR exports to developed market economies, 17.1 percent were made up of machinery and equipment and 26.5 percent of consumer goods, as against 7.8 percent and 12.5 percent respectively for CMEA as a whole (Božik, 1973, p. 18).

1960's. The analysis has been conducted in the absence of any reference to trends in the domestic economies of these countries. In the long run, however, we should expect the direction of trade to be affected significantly by two factors operating in the domestic economies of the socialist states that are, at least in part, mutually offsetting: 1) their ability to produce manufactures of sufficient quality to penetrate Western markets on a large scale and 2) their decreasing surplus, or their increasing deficit, in raw materials, semifabricates, and foodstuffs, due to the combined effects of the relatively inelastic supply of these commodities and of the increasing requirements for their use as industrial inputs in the process of "extensive" industrialization. The first factor should permit CMEA members to increase the share of the West in their purchases of manufactures--a possibility they may or may not wish to take advantage of--while the second should induce them to curtail this share, unless their hard currency resources are replenished from other sources, including credits and tourism. The German Democratic Republic and Czechoslovakia have made some progress in recent years in expanding their exports of manufactures to the West, even though they have not moved significantly in the direction of instituting free markets or competition in their domestic economies. Bulgaria, Poland, and Romania, as late as 1970, still had not displayed any marked ability to penetrate Western markets either with machinery and equipment or with industrial consumer goods.<sup>17</sup> The

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<sup>17</sup> The following were the percentages of machinery and industrial consumer goods in total exports to and imports from developed market economies in 1970: For Bulgaria, 6.0 and 7.9 percent respectively for exports, 31.3 and 4.2 for imports; for Poland, 6.0 and 10.9 percent for exports, 27.9 percent and 3.0 percent for imports; for Romania 4.3 and 13.3 percent for exports, 39.5 and 2.8 percent for imports (Božik, 1973, p. 18).



impact of a diminishing surplus of hard goods on Romania's imports from the West seems to be the best single explanation of the reduction in the share of the West in its imports of manufactures since 1967. Barring any dramatic increase in its exports of manufactures to the West, due to joint production arrangements or to any other source of improvement in the quality and quantity of these exports, it is not likely that Romania will be able to reverse this downward trend in forthcoming years.

In 1971-1972 a major new element began to influence the direction of CMEA trade by commodity groups. This was the *détente* in the relations between the Soviet Union and the United States and the upsurge in trade that accompanied it. It is too early to trace the impact of this new factor on intra- and extra-Comecon trade in manufactured products. Nevertheless, we may speculate about the re-orientation of trade that an expansion of Soviet-U.S. exchanges may bring about. This expansion will undoubtedly be concentrated on U.S. exports of manufactures (chiefly machinery and equipment). If these exports are chiefly sold on long-term credit terms, there need not be a concomitant increase in Soviet sales of raw materials on the world market. But to the extent that these exports of raw materials to the West do expand, they may have to be switched away from CMEA consumers (unless the production of these primary commodities rises faster than had been anticipated in the current five-year plan). The Soviet Union might then no longer be in a position to act as the all-purpose purveyor of raw material inputs for the industries of Eastern Europe and as the never-sated outlet for their manufactures. Since the willingness of the Soviet Union to perform these twin roles has provided the bond that has kept Comecon from disintegrating, it may reasonably be asked

whether the upswing in U.S.-Soviet trade will not force all the East European states to look beyond Comecon for some of their supplies and for new outlets. This re-direction may cause them considerable hardship unless they can adjust their industrial production to expand their sales of manufactures to the West at a reasonable cost.

Appendix

Table A1

Trade of the USSR, Bulgaria, Czechoslovakia,  
the German Democratic Republic, Hungary,  
and Poland with CMEA by Commodity Groups  
(1964)

(Millions of U.S. dollars)

Commodity Group		I	II	III	IV	V	VI	Residual	Given Total
USSR	Exports	850	1996	172	504	373	112	631	4638
	Imports	2025	662	209	169	352	889	202	4508
Bulgaria	Exports	217	47	20	115	248	103	-	749
	Imports	388	228	47	49	16	44	-	772
Czechoslovakia	Exports	952	394	74	32	27	275	-	1753
	Imports	580	563	107	119	238	65	-	1672
German Democratic Republic	Exports	1202	279	219	31	25	393	4	2153
	Imports	282	910	69	230	319	59	-	1868
Hungary	Exports	405	134	30	22	145	173	-	909
	Imports	350	331	80	106	22	51	-	939
Poland	Exports	587	365	43	17	89	158	-	1260
	Imports	523	402	66	95	49	88	-	1224

Note: The residual is computed as the difference between the totals given in the source and the sum of the exports or imports in the commodity groups listed in the source. The original data are presented in rubles, which have been converted in the table at the official exchange rate of 0.9 rubles per dollar.

The commodity groups are defined as follows in the source: I. Machinery and equipment, II. fuels, minerals, raw materials, metals, III. chemicals and building materials, IV. non-food raw materials, V. footstuffs (raw materials), VI. industrial consumer goods.

Comparison with Marer (pp. 87, 111) and with the detailed breakdown of trade with Mongolia in Vnesh. Torg. 1965 indicates that Group I is identical with CTN 1 of the CMEA nomenclature, Group II with CTN 2, Group III with CTN 3 and 4, Group IV with CTN 5, Group V with CTN 7 and 8 (as well probably

Table A1 (continued)

as CTN 6) and Group VI with CTN 9.

From this comparison it emerges that processed foodstuffs must be included in Group V in addition to the raw materials specifically cited in the source.

The given totals appear to exclude Albania for the USSR and the German Democratic Republic, but to include it for all other countries listed. Trade with Mongolia is included for all six countries.

Source: V. N. Zhukov and U. Ia. Ol'sevich, Teoreticheskie i metodologicheskie problemy, 1969, p. 159.

Table A2

Structure of Reciprocal Trade of CMEA Members  
(Total Value of Exports or Imports with CMEA Partners = 100)

Commodity Group		I		II		III		IV		V		VI		Residual	
		X	M	X	M	X	M	X	M	X	M	X	M	X	M
USSR	1960	14.1	42.0	39.1	20.7	3.4	3.4	12.8	4.6	17.1	8.0	3.6	18.2	9.9	3.1
	1965	18.0	44.7	43.0	14.8	3.5	3.5	11.5	3.2	8.5	9.5	2.4	18.9	13.1	5.4
	1967	23.1	42.4	39.2	12.2	3.7	3.7	10.5	3.3	10.7	9.4	2.6	24.3	10.2	4.7
Bulgaria	1960	15.2	49.5	9.6	22.1	1.8	6.5	17.8	7.9	35.5	4.4	19.8	8.6	0.3	1.0
	1965	29.9	50.2	4.6	28.8	1.7	4.8	13.3	6.7	34.7	3.7	14.8	4.8	1.0	1.0
	1967	31.7	55.5	4.1	25.6	2.0	5.4	10.6	5.7	33.4	2.3	17.0	4.7	1.2	0.8
Czechoslovakia	1960	47.3	29.0	23.3	29.3	2.3	6.3	1.9	8.6	3.3	22.0	21.1	4.0	0.8	0.8
	1965	56.3	35.6	21.1	33.0	3.7	5.6	1.8	6.7	1.7	12.4	14.2	5.1	1.2	1.6
	1967	57.1	35.1	17.0	30.7	4.3	5.4	1.7	6.6	1.5	15.5	17.0	5.4	1.4	1.3
German Democratic Republic	1960	56.3	11.9	15.7	45.3	11.7	3.1	1.9	12.5	0.8	22.6	12.8	4.5	0.8	0.1
	1965	58.6	17.9	12.6	47.3	9.5	3.6	1.2	13.6	0.6	13.4	16.8	3.4	0.7	0.8
	1967	57.8	30.7	11.7	36.0	9.6	3.3	1.3	10.5	0.4	14.7	18.6	4.0	0.6	0.8
Hungary	1960	46.2	35.5	13.6	32.5	2.3	5.5	4.1	14.3	15.5	5.7	17.9	5.8	0.4	0.7
	1965	42.8	35.1	13.0	34.3	3.0	7.1	2.2	11.8	16.7	4.9	21.4	5.7	0.9	1.1
	1967	42.1	38.4	11.8	28.0	3.0	7.1	2.0	11.8	16.3	5.9	23.8	6.8	1.0	2.0
Poland	1960	37.4	33.5	42.1	31.1	2.2	6.3	1.3	10.2	5.2	10.7	11.3	7.6	0.5	0.6
	1965	48.7	43.6	28.4	28.6	2.8	5.4	1.2	7.5	6.0	6.0	12.4	8.4	0.5	0.5
	1967	49.3	44.3	24.0	28.7	2.6	5.0	1.1	6.3	4.3	8.2	18.2	7.0	0.5	0.5

Notes: X stands for exports, M for imports. Commodity groups are defined as follows in the source: I. Machinery and equipment, II. fuels, minerals, and metals, III. products of chemical industry, IV. non-food raw materials of vegetable or animal origin, V. food raw materials and foodstuffs,

Table A2

(continued)

VI. consumer goods. These groups correspond, respectively, to CTN 1, 2, 3, 5, 7, 8, and 9 (with 7 and 8 aggregated into Group V). The only omitted groups are CTN 4 (building materials) and CTN 6 (live animals), which is presumably aggregated with Group V.

Source: V. N. Zhukov and U. Ia. O'lsevich, Teoreticheskie i metodologicheskie problemy, 1969, p. 159.

Appendix B

Factors Affecting the Shares of Machinery Products  
and of All Manufactured Goods in Total Exports  
in Sixty-Nine Countries

Exports of machinery and other manufactured goods normally increase with a country's level of development. Are countries pursuing a Soviet-type strategy of development (with a high investment rate and a concentration of investments in heavy industry) likely to have higher shares of machinery and of other manufactured exports in their total exports than countries at the same stage of development? Does membership in a customs union make a difference in this regard for members of CMEA, the European Economic Community or of other unions favoring mutual exchanges of manufactures? The hypothesis is that all three factors (level of development, Soviet-type strategy, and membership in a customs union) should raise both the share of machinery products and the share of all manufactured goods in total exports. Moreover, inasmuch as countries with a large population and a wide internal market are more likely, for a given GDP per capita, to develop manufacturing industries exhibiting economies of scale, a larger population, other things equal, may also have the effect of raising these shares.

In the following regressions, Soviet statistics of machinery exports have been adjusted to make them more comparable with the statistics of other CMEA members, in accord with the arguments developed in Part I of

this paper, by including in the machinery group estimated exports of Soviet arms.

The countries pursuing a Soviet-type strategy include all European members of CMEA plus Yugoslavia. All data refer to 1964 or 1965.<sup>1</sup> The sample consists of 69 countries, developed and underdeveloped, socialist and non-socialist economies.

The form of the regressions is as follows:

$$S = \alpha + \beta G + \gamma P + \delta R + \eta M$$

where S is the share to be explained,  $\alpha$  is a constant (the intercept of the regression hyperplane), G is estimated Gross Domestic Product per capita in U. S. dollars, P is population in millions, R is a dummy variable which is equal to 1 if a country is pursuing a Soviet-type strategy of development and zero if it is not, and M is another dummy variable which equals 1 if a country is a member of a customs union and zero if it is not. The coefficients  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ , and  $\eta$  are estimated from the one-stage least-squares regression. The regression results for the share of manufactures<sup>2</sup> in total exports ( $S_m$ ) are as follows:

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<sup>1</sup>For countries other than CMEA, statistics of gross domestic product per capita are from United Nations, Yearbook of National Accounts (1970). For CMEA, estimates of GDP per capita in 1965 are those prepared by the Economic Commission for Europe. These estimates were adjusted upwards by 5.5 percent across the board to improve their comparability with the U.N. statistics for other countries.

<sup>2</sup>Manufactures include machinery and equipment including estimated arms for the Soviet Union (CTN Group 1), chemicals (CTN Group 3), building materials (CTN Group 4) and industrial consumer goods (CTN Group 9). In addition, exports of metals in CTN Group 2 have also been included. For the USSR, Hungary, and Yugoslavia, this definition is equivalent to SITC Groups 5-8 (with an adjustment for the residual in the case of the USSR). All data for CMEA, except for the USSR, are from Marer. Data for the USSR are from Tables 1 and 2.



$$S_m = .0667 + .000188 G + .000753 P + .2159 R + .1282 M$$

$$(.0486) \quad (.000036) \quad (.000414) \quad (.0914) \quad (.0594)$$

Standard errors are shown in parentheses. The square of the coefficient of multiple correlation,  $R^2$ , equals 0.46. The coefficients of all four variables are significant at the 95 percent level.

An alternative specification regressing the share of manufactures exports on logarithms of GDP per capita and of total population together with the same dummy variables gave these results:

$$S_m = -.9828 + .1746 \log G + .07245 \log P + .0970 R + .0913 M$$

$$(.1737) \quad (.0268) \quad (.01724) \quad (.08452) \quad (.05352)$$

With this specification,  $R^2$  rises to 0.565, the coefficients of the GDP per capita and population variables are even more significant than when absolute values were used (above 99 percent). While the coefficient of the membership dummy remains significant at the 95 percent level, the Soviet-style strategy dummy now just falls short of significance at the 90 percent level. The shares of manufactures in total exports of countries pursuing a Soviet-type strategy (CMEA members plus Yugoslavia) are only slightly larger than one would expect, given their relative level of GDP per capita and population and the fact that all but one are members of a customs union.

The two corresponding regressions (on absolute values of GDP per capita and population and on their logs) for the share of machinery and equipment ( $S_e$ ) in total exports are shown below:

$$S_e = -.0398 + .000101 G + .000263 P + .1974 R + .0568 M$$

$$(.0172) \quad (.000013) \quad (.000146) \quad (.0323) \quad (.021)$$

$$S_e = -.5304 + .08258 \log G + .0341 \log P + .1403 R + .04393 M$$

$$(.0622) \quad (.0096) \quad (.00617) \quad (.0303) \quad (.01916)$$

$R^2$  for the first of these regressions equals 0.70 and for the second 0.75.

All coefficients in both regressions are significant at the 95 percent level. The fit is even better when logs of GDP per capita and population rather than their absolute values are used. For these regressions, the Soviet-type strategy dummy is significant at the 99 percent level.

Appendix C

Trade of East European Countries with the USSR,  
CMEA, and the Rest of the World by CTN Broad Divisions (Mid-1960's)  
(Millions of U.S. Dollars)

		EXPORTS			IMPORTS		
		Soviet Union	CMEA (excl. USSR)	Rest of World	Soviet Union	CMEA (excl. USSR)	Rest of World
<u>Bulgaria, 1966</u>							
CTN	I	199	116 <sup>a</sup>	16	344	168 <sup>a</sup>	184
	II	90	84 <sup>a</sup>	124	332	94 <sup>a</sup>	201
	III	232	109 <sup>a</sup>	144	12	28 <sup>a</sup>	47
	IV	<u>143</u>	<u>28<sup>a</sup></u>	<u>19</u>	<u>18</u>	<u>30<sup>a</sup></u>	<u>20</u>
Total		664	338 <sup>a</sup>	303	707	319	452
<u>Czechoslovakia, 1967</u>							
CTN	I	578	497	318	238	400	182
	II	169	291	357	538	262	472
	III	12	16	101	174	108	157
	IV	<u>218</u>	<u>102</u>	<u>206</u>	<u>15</u>	<u>83</u>	<u>50</u>
Total		977	906	981	965	853	862
<u>GDR, 1965</u>							
CTN	I	816	460	182	99	242	81
	II	237	206	447	939	303	486
	III	1	9	82	164	91	321
	IV	<u>257</u>	<u>192</u>	<u>180</u>	<u>4</u>	<u>61</u>	<u>19</u>
Total		1311	867	892	1205	698	907

Appendix C (continued)

		EXPORTS			IMPORTS		
		Soviet Union	CMEA (excl. USSR)	Rest of World	Soviet Union	CMEA (excl. USSR)	Rest of World
<u>Hungary, 1965</u>							
CTN	I	265	163	66	169	173	85
	II	60	130	170	338	190	338
	III	62	105	167	36	12	99
	IV	<u>139</u>	<u>75</u>	<u>108</u>	<u>10</u>	<u>45</u>	<u>25</u>
Total		525	474	511	553	420	547
<u>Poland, 1965</u>							
CTN	I	403	240	124	259	371	138
	II	195	239	348	385	221	501
	III	52	27	325	53	34	222
	IV	<u>131</u>	<u>33</u>	<u>110</u>	<u>31</u>	<u>90</u>	<u>37</u>
Total		781	539	908	728	716	896
<u>Romania, 1965</u>							
CTN	I	80	87	36	158	103	158
	II	171	103	225	214	94	244
	III	60	46	131	2	8	24
	IV	<u>128</u>	<u>11</u>	<u>22</u>	<u>33</u>	<u>5</u>	<u>34</u>
Total		438	247	414	406	210	460

<sup>a</sup>Trade with all socialist countries excluding the USSR.

Note: CTN broad divisions are defined in the notes to Table 3. Small discrepancies in the totals are due to rounding errors.

Sources:

Bulgaria: Trade with Soviet Union is from Table 3; trade with socialist countries from Popisakov, p. 205. Czechoslovakia: Trade with the Soviet Union, Voprosy ekonomiki, No. 4, 1969, p. 120; trade

Appendix C (continued)

with CMEA, Table A2. German Democratic Republic, Hungary, Poland: Trade with the Soviet Union, unpublished estimated by J. van Brabant; trade with CMEA is estimated from the percentage breakdowns in Table A2. Romania: Trade with the Soviet Union, Table 3; trade with CMEA is estimated from Montias, pp. 175 and 179, data in Romania Socialistă și Cooperarea Internațională, p. 243 and Romanian Foreign Trade, No. 4, 1972, p. 23, and unpublished van Brabant data.

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