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A Note on the Conversion of Ruble Trade Flows into Dollars

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Summary

This paper develops a simple methodology for evaluating the extent to which official statistics on CMEA countries' ruble trade flows settled in transferable rubles (TRs), when converted into U.S. dollars, may not be directly comparable to these countries' statistics on trade settled in other currencies. Problems of noncomparability of ruble and nonruble trade flows arise because in general intra-CMEA foreign trade prices are distorted from world market relative prices, and national cross rates between the TR and the U.S. dollar may differ from the accounting exchange rate, set by the International Bank for Economic Cooperation (IBEC), at which prices for most intra-CMEA trade flows are initially converted from dollars into TRs.

The degree of bias involved in converting ruble trade flows into dollars will depend on the extent of price distortion (vis-à-vis world market prices) in a country's ruble trade, and whether the conversion is made "backwards" using the accounting TR/U.S. dollar exchange rate set by IBEC, or "forwards" using the country's official domestic currency/U.S. dollar exchange rate. The paper derives the resulting conversion bias ratio in each case and illustrates diagrammatically how changes in a country's exchange rates, in the IBEC rate, or in the degree of price distortion in a country's ruble trade will affect the ultimate degree of conversion bias. Although a country in theory may eliminate any forward conversion bias by adjusting its cross rate, no single cross rate can totally eliminate this bias if the average degree of price distortion differs between its imports from and exports to the ruble area.

Illustrative calculations of conversion bias for the East European members of the CMEA and the U.S.S.R. in 1983 indicate that considerable differences in forward conversion bias arise among some of these countries, given the same hypothetical degree of price distortion in each country's intra-CMEA trade. In the absence of generally agreed-upon estimates of actual price distortions in intra-CMEA trade, adjustment of reported statistics using the approach elaborated in this paper may not be possible. If such adjustments are not made, it is suggested that direct comparisons of trade values and changes in trade values and unit values, between these countries' ruble and nonruble trade, be avoided or undertaken only with care.

I. Introduction

Comparisons between a CMEA country's trade flows settled in transferable rubles (TRs) and its trade settled in convertible currencies are frequently misleading. 1/ A country's trade flows in TRs revalued into U.S. dollars may not be comparable to its convertible currency trade for two reasons. First, relative prices in intra-CMEA trade settled in TRs are in general different from those prevailing in nonruble trade. 2/ These settlements are carried out through a multilateral clearing arrangement at the CMEA's International Bank for Economic Cooperation (IBEC). 3/ Although IBEC sets a uniform exchange rate for the conversion of prices from, say, U.S. dollars into TRs, each commodity traded within the CMEA for which settlement is in TRs has in general a different implicit TR/dollar exchange rate, and this rate can vary substantially across commodities and between exports and imports. Second, the cross rate between the transferable ruble and the U.S. dollar implied by each CMEA country's official exchange rates used for reporting foreign trade may not approximate the weighted average cross rate implied by actual prices in that country's trade with the ruble and nonruble areas, respectively.

That comparisons between a CMEA country's ruble and nonruble trade flows may be misleading has long been known to close observers of Soviet and East European foreign trade. In recent years, the pioneering yet controversial work of Marrese and Vanous (1983) has in fact been partially based on the recognition of the price and exchange rate distortions noted above. The present paper is not meant to join the debate over the empirical results of Marrese and Vanous, nor over their interpretation of these findings. 4/ Instead, its purpose is to present a simplified methodology for evaluating to what extent reported statistics on ruble trade flows may not be directly comparable to official statistics for nonruble trade.

1/ The CMEA, or Council for Mutual Economic Assistance, is composed of Bulgaria, Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Mongolia, Poland, Romania, the U.S.S.R., and Viet Nam.

2/ A part of intra-CMEA trade is settled in convertible currencies, and most of this is commonly believed to be transacted at world market prices.

3/ The activities of the IBEC are described in Allen (1976).

4/ This debate, over the existence and measurement of so-called implicit trade subsidies in Soviet-East European trade, is found inter alia in Brada (1984), Dietz (1985), Marer (1984), Marrese and Vanous (1983; forthcoming), and Wolf (1985). Van Brabant (1985) presents recent empirical evidence on the relationship between world and intra-CMEA foreign trade prices.

Using simplified notation, the second section derives two alternative measures of the extent to which a CMEA country's ruble trade converted into dollars would give a biased valuation of that trade if compared with a valuation based on world market prices. One of these measures is based on the "backward" conversion of these trade flows from national currency units into dollars, by using the official TR/domestic currency exchange rate and the U.S. dollar/TR rate set by IBEC. The second measure reflects "forward" conversion from national currency units into dollars by means of the country's official U.S dollar/domestic currency exchange rate.

In the third section, the relationships among the different exchange rates and the measure of price distortion developed in Section II are examined with the aid of a diagram; this will clarify the factors which may cause the degree of conversion bias to change over time.

In the fourth section, illustrative calculations are presented of the percentage conversion bias that would have existed, under the alternative measures, for each East European member of the CMEA and for the Soviet Union, in 1983. The calculations are based on these countries' actual exchange rates and a set of alternative hypothetical intra-CMEA price distortion parameters. Brief concluding remarks are presented in Section V.

It is hoped that this paper will finally make fully transparent the methodological and statistical issues involved in converting ruble trade flows into dollars.

II. Measures of Bias in Converting Ruble Trade Flows into Dollars

Intra-CMEA foreign trade prices historically have been bilaterally negotiated on a basis of documented world market prices for similar products. We define the weighted average world market price in dollars for a bundle of goods traded by a given CMEA member within the CMEA as P_d. 1/ This is the price which negotiators are assumed to use as a starting point for setting prices in mutual trade. 2/ In general, this price will be adjusted to take into account such factors as perceived transitory fluctuations on the world market, the alleged effects of imperfect competition on that market, possible purposeful subsidization, and of course the

1/ If a CMEA country's trade with non-members of the CMEA is transacted at prices differing on average from "world market prices," then the former prices should be used as the basis for P_d.

2/ Different facets of foreign trade price-setting within the CMEA are discussed in Hewett (1974), Marrese and Vanous (1983), Dietz (1985) and van Brabant (1985).

relative bargaining power of the two CMEA trade partners. The percentage adjustment or distortion to the world market price in dollars is indicated by α, such that the adjusted "dollar" price in intra-CMEA trade would be $P_d(1+\alpha)$. 1/

At some point before, during or following these negotiations the dollar price of the bundle is converted into transferable rubles for purposes of compiling national foreign trade statistics and clearing at the IBEC. The TR equivalent of this price will be:

$$(1) \quad P_r = P_d(1+\alpha)e_i,$$

where P_r is the price expressed in transferable rubles and e_i is the official TR/dollar exchange rate set by IBEC.

The official foreign trade statistics of a given CMEA member will report the value of this bundle by converting the TR value into either (a) valuta (or deviza) units ($P_{(r)}'$) using the so-called external or valuta exchange rate, or (b) domestic currency units ($P_{(r)}$), using the commercial exchange rate: 2/

$$(2) \quad P_{(r)}' = P_r e_r', \quad \text{and} \quad P_{(r)} = P_r e_r,$$

where e_r' and e_r are the valuta and commercial exchange rates respectively vis-à-vis the transferable ruble.

The value of the transferable ruble trade bundle, expressed in currency units of the given CMEA country, can be converted into U.S. dollars in two ways. First, conversion can be made "backwards" into dollars by dividing, say, the national valuta price $P_{(r)}'$ by the valuta exchange rate for the transferable ruble (e_r'), and further dividing by the IBEC TR/dollar exchange rate: 3/

1/ It should be noted that the percentage price distortion (α) may differ as between any two pairs of CMEA trade partners even for an identical bundle of goods.

2/ See Wolf (1985a) for elaboration. At the present time these conversions are made using valuta exchange rates in Bulgaria, Czechoslovakia, and the U.S.S.R., a "statistical commercial" rate in the German Democratic Republic, and commercial rates in Hungary, Poland, and Romania.

3/ If the country uses a commercial exchange rate to derive its foreign trade statistics, equation (3) would read: $P_{e1} = P_{(r)}/(e_r e_i)$, and equation (5) would be $P_{e2} = P_{(r)}/e_d$.

Table 1. Glossary of Terms Used

α	=	Percent distortion of intra-CMEA foreign trade prices from world market prices, for a bundle of goods traded within the CMEA; see equation (1).
e_i	=	TR/U.S. dollar accounting exchange rate set by the International Bank for Economic Cooperation (IBEC); see equation (1).
e_r	=	Official commercial exchange rate for the TR, for a given CMEA country; see equation (1).
e_r'	=	Official valuta (deviza) exchange rate for the TR, for a given CMEA country; see equation (2).
e_d	=	Official commercial exchange rate for the U.S. dollar, for a given CMEA country; see equation (5).
e_d'	=	Official valuta (deviza) exchange rate for the U.S. dollar, for a given CMEA country; see equation (7).
e_c, e_c'	=	Cross commercial and valuta exchange rate respectively, between TR and the U.S. dollar, for a given CMEA country; see equation (6).
P_d	=	Weighted average world market price, in dollars, for a bundle of goods traded within the CMEA; see equation (1).
P_r	=	The TR price of this same bundle of goods; see equation (1).
$P(_r)$, $P(_r')$	=	The domestic currency and valuta price respectively of a bundle of goods settled in TRs; see equation (2).
P_{e1}	=	The U.S. dollar equivalent of the TR price, when the IBEC rate method is used for conversion (i.e., "backwards" conversion); see equation (3).
P_{e2}	=	The U.S. dollar equivalent of the TR price, when the country cross rate is used for conversion (i.e., "forwards" conversion); see equation (5).

$$(3) \quad P_{e1} = P'_{(r)}/(e'_r e_1),$$

where Pe_1 is the dollar equivalent of the ruble trade flow. Substituting equation (1) into (2), and (2) into (3) and simplifying, gives:

$$(4) \quad P_{e1}/P_d = (1+\alpha).$$

The ratio P_{e1}/P_d may be thought of as a measure of the bias involved in using this approach to convert ruble trade flows into dollars. Using this approach, the bias ratio is simply equal to the degree of price distortion involved in a country's intra-CMEA trade settled in TRs. A ratio greater (less) than unity indicates that the dollar equivalent of the ruble trade flow is overstated (understated) relative to its world market value. Equation (4) holds regardless of whether the CMEA country uses a valuta or a commercial rate to convert TR magnitudes into domestic currency units.

A second way of evaluating this country's ruble trade bundle in dollars, still using official exchange rates, is to convert "forward" by dividing, say, the national valuta price ($P'_{(r)}$) by the valuta exchange rate for the dollar:

$$(5) \quad P_{e2} = P'_{(r)}/e'_d,$$

where P_{e2} is the dollar equivalent of the ruble trade flow using this approach, and e'_d is the valuta exchange rate for the dollar. Again substituting equation (1) into (2), and now equation (2) into (5) and simplifying, gives:

$$(6) \quad P_{e2}/P_d = \frac{(1+\alpha)\ e_1}{e'_c}$$

where e'_c equals the official cross-valuta rate (e'_d/e'_r) of the country in question. Equation (6) also holds in the event that the country derives its trade statistics on the basis of commercial exchange rates, except that in this case the denominator is the cross-commercial rate ($e_c = e_d/e_r$), or the ratio of the two commercial exchange rates.

Using this forward, or country cross rate approach, the bias ratio is seen to be more complex than in the case of backwards conversion. In the forward case, the extent of bias is a function of the ratio between the IBEC TR/dollar accounting exchange rate (e_i) and the TR/dollar cross rate of the given CMEA country (e_c') as well as of the degree of price distortion in intra-CMEA trade. It should be noted that the three variables on the right-hand side of equation (6) are determined by fundamentally different mechanisms. The IBEC exchange rate, e_i, is from the point of view of an individual CMEA member an exogenous variable, the value of which is set by IBEC. 1/ The weighted average measure of intra-CMEA foreign trade price distortion ($1+\alpha$) for a given CMEA member is determined by various CMEA price rules and bilateral bargaining between that country and other CMEA members over foreign trade prices and volumes. Finally, the cross-rate (e_c' or e_c) is a policy variable under the control of the national authorities.

Observe that the degree of bias using the two approaches will differ only if the IBEC exchange rate and the individual country's TR/dollar cross rate implicit in its trade statistics are different (i.e., if $e_i \neq e_c'$, or $e_i \neq e_c$). Specifically, forward conversion will yield a smaller absolute conversion bias than backward conversion if

$1.0 < e_c/e_i < (1 + \alpha)(1 - \alpha)^{-1}$ when $\alpha > 0$, and if

$(1 + \alpha)(1 - \alpha)^{-1} < e_c/e_i < 1.0$ when $\alpha < 0$.

In general, in the presence of intra-CMEA price distortions, the likelihood that forward conversion will yield a lower absolute bias will be greater, the closer the national cross rate is to $(1+\alpha)\, e_i$. Also note that even if there is no price distortion in a country's ruble trade, the forward approach to conversion could still yield a biased dollar equivalent of this trade if the cross rate and the IBEC exchange rate differ. For example, assume that the country's own relative valuation of the U.S. dollar, vis-à-vis the TR, is higher than that of IBEC (i.e., $e_c' > e_i$). In this case, even if there is no price distortion in intra-CMEA trade ($\alpha = 0$), conversion of this country's ruble trade flows into dollars using the forward approach will understate the value of this trade ($P_{e2}/P_d < 1.00$). This is because a higher TR/U.S. dollar exchange rate has been used to convert forward from TRs into dollars (e_c') than was used by IBEC to convert originally from dollars into TRs (e_i).

1/ Since 1977 IBEC has pegged the TR against a basket of convertible currencies, presumably using weights based on the actual weights of various convertible currencies in total CMEA trade. See van Brabant (1985).

It makes little sense to consider adjusting the IBEC exchange rate to reflect purchasing power parity (PPP). If we divide both sides of equation (1) by P_d we have:

$$(7) \quad P_r/P_d = (1+\alpha)e_i.$$

Assume that the degree of price distortion (α)is positive so that that $P_r/P_d > e_i$. In this case it might be concluded that the transferable ruble is overvalued (by IBEC) vis-à-vis the U.S. dollar. At first glance the implication might be that the IBEC rate (e_i) should be raised, so as to reflect PPP between the TR and the dollar. As long as the price distortion in intra-CMEA trade persists, however, raising the IBEC rate will only have the effect of increasing the ratio of the TR price to the dollar price (P_r/P_d) for the bundle of goods, and the overvaluation (100α percent) will continue. A change in the IBEC exchange rate does not in and of itself affect the degree of overvaluation of the TR because the degree of foreign trade-price distortion, unlike in the case of the overvaluation of a particular country's currency, is determined bilaterally and presumably independently of the IBEC exchange rate.

Although manipulation of the IBEC rate would not remove over- or undervaluation of the TR vis-a-vis the dollar, the authorities in a CMEA member country may set the national TR/U.S. dollar cross rate so as to take into account this over- or undervaluation. Specifically, equation (6) shows that setting e_c (or e_c^*) equal to $(1+\alpha)e_i$ would remove the forward conversion bias and, it can be easily shown, would equate the average domestic currency cost of an identical bundle of goods exported to either the ruble or non-ruble area respectively, or the average domestic currency cost of an identical bundle of goods imported from either area. 1/ If the average degree of price distortion in ruble exports differs from that in ruble imports ($\alpha_x \neq \alpha_m$), however, then clearly no single cross-rate can yield zero forward conversion bias for both exports and imports. Likewise, the backward or IBEC rate method would in this case yield different degrees of conversion bias for imports and exports.

III. A Diagrammatic Analysis

The relationship between the degree of price distortion in intra-CMEA trade, the different exchange rates and the indicated conversion bias is illustrated in Figure 1. Because the IBEC exchange rate method converts

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1/ It should be noted, however, that the correct cross rate from the standpoint of eliminating conversion bias has very little to do, in principle, with the cross rate that might be consistent with achieving macroeconomic balance in a planned economy.

"backwards" into U.S. dollars, using the domestic currency/TR and IBEC TR/dollar rates, the effect of a possible inconsistency between the IBEC and country-cross rates is eliminated. The bias in the value of ruble trade flows reported in dollars is therefore equal in this case to the degree of price distortion in intra-CMEA trade. The right-hand side of the horizontal axis in the figure measures the degree of price distortion $(1+\alpha)$ and therefore the extent of backward conversion bias as well. For example, if a country's intra-CMEA ruble trade prices were on average distorted upwards by, say, 50 percent ($(1+\alpha) = 1.50$), that would also be the extent to which the IBEC conversion procedure would overstate ruble trade flows relative to their valuation at world market prices.

As the preceding discussion has suggested, the determination of conversion bias using the country cross rate (or "forward") approach is more complicated. In the figure it is assumed that the IBEC exchange rate (e_i) is exogenously set at .758 (see the ray from the origin in the northwest quadrant of the figure). 1/ It is also assumed that a given CMEA country has set its commercial exchange rate vis-a-vis the TR (e_r) at 13.193 (see the ray from the origin in the southwest quadrant of the diagram).

First consider the case in which the authorities set a commercial exchange rate for the U.S. dollar (e_d) equal to 10 (see the bottom half of the vertical axis). Dividing this exchange rate by the TR rate yields a cross rate (e_c) of 0.758 (see the left-hand side of the horizonal axis). Further dividing this cross rate by the given IBEC rate gives the ratio e_c/e_i plotted on the top half of the vertical axis. In this case the cross rate is equal to the IBEC rate, therefore the resulting ratio is equal to 1.00 (see Q on the vertical axis).

The conversion bias ratio (P_{e2}/P_d of equation (6)) is then derived by dividing the ratio of price distortion in this country's CMEA trade settled in rubles $(1+\alpha)$ by the ratio e_c/e_i. Clearly, if these two ratios are equal, we end at a point on the 45° line in the northeast quadrant. This would happen in the case at hand if, for example, there were no price distortion, on average, in this country's intra-CMEA trade (see point S). Although the cross rate and the IBEC rate are equal here, observe that the forward conversion bias will be positive (negative) if the price distortion in trade is positive (negative).

The percentage conversion bias using the country cross-rate approach is measured horizontally in the figure as the distance between the point achieved in the northeast quadrant and the 45° line, divided by the distance between the corresponding point on this line and the vertical axis.

1/ This was the average IBEC rate in 1983, according to van Brabant (forthcoming).

For example, assume that intra-CMEA foreign trade prices are in this case distorted upwards by 50 percent. Given the assumed exchange rates, this would place the conversion bias ratio at point T in the figure. The percentage conversion bias would be [100(QT-QS)]/QS, or [100(1.50-1.00)]/1.00 = 50 percent.

A conversion bias of 50 percent would mean, in the absence of trade taxes or subsidies differentiated by trading area, that an enterprise in this country exporting a given bundle of goods to the ruble area would receive a 50 percent higher price than it would obtain by exporting this same bundle to the nonruble area. Now assume that the authorities wish to equate the domestic currency cost of exporting identical goods to each area. If they devalue against the dollar by 50 percent, the commercial rate for the dollar will increase from 10 to 15 units of domestic currency. This higher rate, divided by an unchanged TR exchange rate, yields a higher cross rate equal to 1.137 (see the left-hand side of the horizontal axis). Because the IBEC rate has not changed, the ratio e_c/e_i is now equal to 1.50 (= 1.137/.758; or Q' on the vertical axis). Given the 50 percent foreign trade price distortion, the 50 percent devaluation in this case exactly eliminates the conversion bias (see point S' on the 45° line).

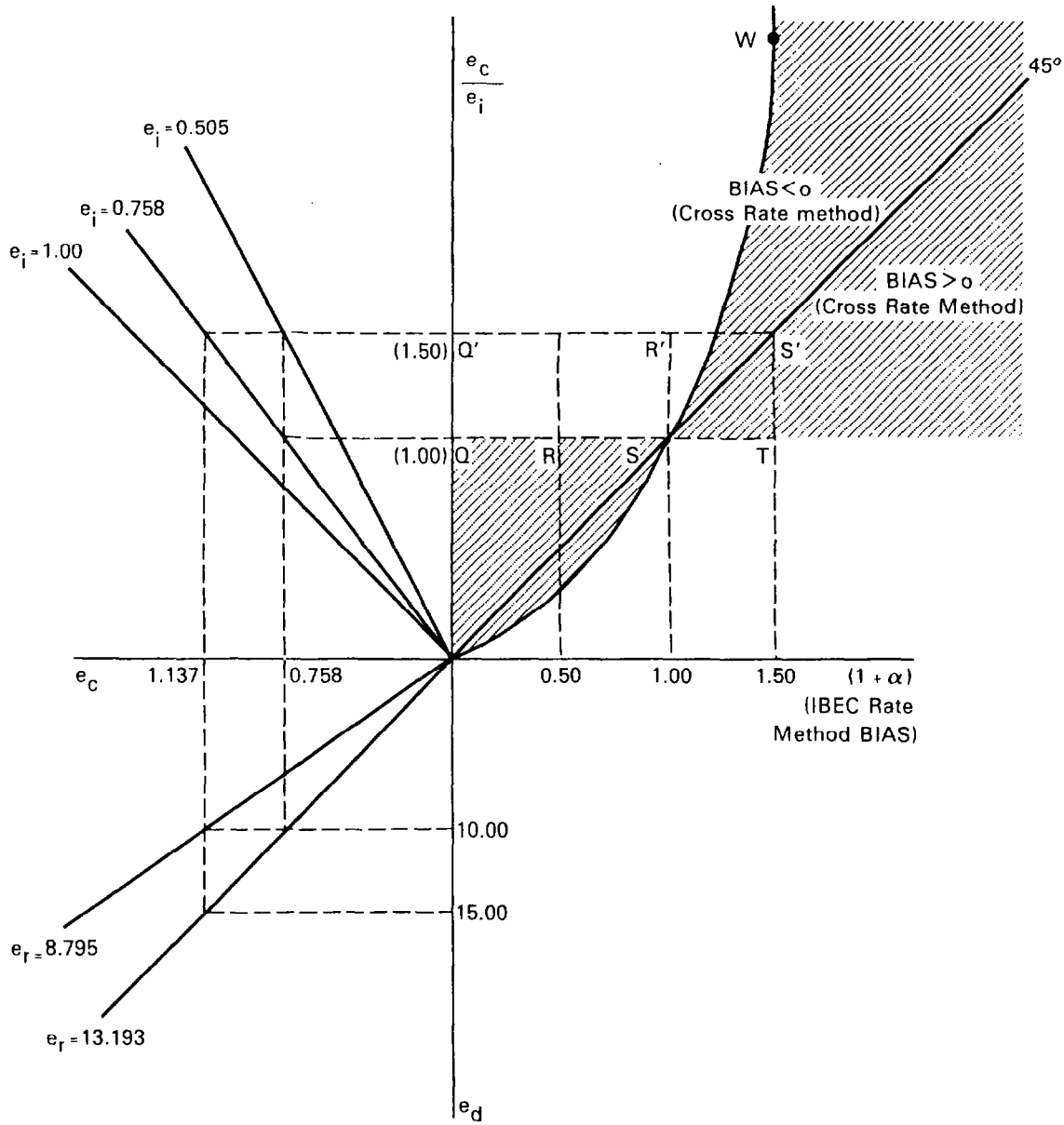
(Observe that if the devaluation occurred in the absence of foreign trade price distortions ($1+\alpha = 1.00$), the ratio of forward conversion bias after the 50 percent devaluation against the dollar would be located at point R' in the northeast quadrant. In this case the conversion bias would change from zero (at point S) to minus 33 percent [100(Q'R'-Q'S')]/Q'S', or [100(1.0-1.5)]/1.5.)

Similar changes in forward conversion bias would accompany a <u>ceteris paribus</u> 33 percent revaluation against the transferable ruble (as indicated by the 33 percent upward shift of the TR exchange rate ray in the southwest quadrant), an exogenous 33 percent reduction in the IBEC rate from .758 to .505 (see the upward shift of the IBEC rate ray in the northwest quadrant), or differential rates of inflation in dollar- and TR- denominated foreign trade prices that reduce the degree of price distortion by 33 percent, from 1.50 to 1.00.

The shaded areas in the northeast quadrant indicate the range of possible cross rate/IBEC exchange rate ratios that would yield a smaller absolute percentage conversion bias, using the forward rather than the backward approach, given different degrees of foreign trade price distortion. For example, a e_c/e_i ratio of 3.0 (point W) would yield a conversion bias of negative 50 percent which would just equal, in absolute terms, the positive 50 percent bias using the backward approach, given a positive 50 percent price distortion in intra-CMEA trade (point T). 1/

1/ The frontier (OSW) describing the two regions of smaller absolute conversion bias using the forward approach, is defined by the equation $e_c/e_i = (1 + \alpha)(1 - \alpha)^{-1}$.

FIGURE 1


W
45°
$\frac{e_c}{e_i}$
$e_i = 0.505$
$e_i = 0.758$
$e_i = 1.00$
BIAS < o
(Cross Rate method)
BIAS > o
(Cross Rate Method)
(1.50) Q'
R'
S'
(1.00) Q
R
S
T
e_c
1.137
0.758
0.50
1.00
1.50
$(1 + \alpha)$
(IBEC Rate
Method BIAS)
10.00
15.00
$e_r = 8.795$
$e_r = 13.193$
e_d

IV. Illustrative Calculations of Conversion Bias

Illustrative calculations are presented in Table 2 of the percentage conversion bias that would have existed for the two approaches to conversion of ruble trade flows (backward and forward), for each East European member of the CMEA and for the Soviet Union in 1983, using these countries' actual exchange rates and a set of alternative hypothetical intra-CMEA price distortion parameters. It should be kept in mind when using the table that in general the degree of price distortion will vary betweeen a given country's exports and imports, and across countries. 1/

The trade statistics of three countries, Bulgaria, Czechoslovakia and the Soviet Union, are based on foreign currency values converted into valuta. For each of these countries, therefore, the exchange rates reported in the first two columns of the table are valuta rates. Foreign trade statistics appearing in the official Romanian statistical publication are based on foreign currency values converted into domestic currency at commercial exchange rates. Case (1) for Romania in the Table refers to calculations made using that country's commercial exchange rates. If Romania's TR trade were to be converted into dollars using that country's cross valuta rate, the conversion bias would be as indicated by Case (2). The rate implicit in the trade statistics of the German Democratic Republic is the so-called statistical commercial rate, although this exchange rate appears to have a more limited role in influencing domestic prices, through transaction prices, than its counterpart in Hungary and Poland. 2/ The trade statistics of Hungary and Poland are now reported on the basis of conversion at the commercial rates. In recent years these two countries have set their commercial rates in a way designed to reflect somewhat the average domestic currency cost of earning through export one TR and one U.S. dollar, respectively, although other considerations are also taken into account. Their cross commercial rates therefore differ substantially from the IBEC rate (= .758 in 1983), and they fluctuate considerably over time. 3/

1/ The most comprehensive studies to date of intra-CMEA price distortions are Marrese and Vanous (1983) and Vanous and Marrese (1984). Their findings are quite controversial (see footnote 4, page 2).

2/ The exchange rate systems of these three countries are reviewed in Wolf (1985a). Havlik (1985) examines the exchange rate structure in Czechoslovakia.

3/ *In late 1981 Hungary unified its commercial and noncommercial rates* into one exchange rate against the U.S. dollar. Commercial transactions in TR are valued in Hungarian statistics at the official TR rate, whereas noncommercial transactions with CMEA members are valued at bilateral rates applying separately to each CMEA country's currency. A similar exchange rate structure has existed in Poland since the beginning of 1982.

Table 2. Illustrative Calculation of Percentage Conversion Bias for Ruble Trade Flows Expressed in U.S. Dollars, 1983

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Domestic Currency/ U.S. Dollar Exchange Rate (e_d, e_d')	Domestic Currency/ TR Exchange Rate (e_r, e_r')	Country Cross Rate (1)/(2) (e_c, e_c')	Hypothetical Weighted Average Foreign Trade Price Distortion in a Country's Trade with Other CMEA Members Settled in Transferable Rubles						
				-50%	-20%	0%	20%	50%	75%	100%
A. Conversion at IBEC rate (=.758)	All Countries			-50	-20	0	20	50	75	100
B. Conversion at country cross rate										
Bulgaria	0.9737	1.3	.749	-49	-19	1	21	52	77	102
Czechoslovakia	6.2933	8.0	.787	-52	-23	-4	16	44	69	93
G.D.R.	3.54	4.67	.758	-50	-20	--	20	50	75	100
Hungary	42.67	26.0	1.641	-77	-63	-54	-45	-31	-19	-8
Poland	91.6	68.0	1.347	-72	-55	-44	-32	-15	-2	13
Romania (1)	17.18	17.0	1.011	-63	-40	-25	-10	12	31	50
(2)	4.47	6.67	.670	-43	-9	13	36	70	98	126
U.S.S.R.	0.743	1.0	.743	-49	-18	2	22	53	79	104

Note: Columns (1) - (3): The exchange rates for Bulgaria and Czechoslovakia are valuta exchange rates from van Brabant (forthcoming). The exchange rate for the U.S.S.R. is the valuta rate from Vanous (1984). The valuta (Case (1)) exchange rate for Romania is from van Brabant (forthcoming). The other rates are "commercial statistical rates" (GDR) from van Brabant (forthcoming) and commercial rates for Hungary (IFS, 1985; SE, 1984), Poland (RSHZ, 1984) and Romania--case (2), from IFS, 1985 and van Brabant (forthcoming).

Columns (4) - (10): The percentage conversion bias is calculated for Section A (IBEC rate or "backward" approach) according to equation (4), and for Section B (country cross rate or "forward" approach) according to equation (6), where the percentage bias is defined as $(P_e/P_d)-1.00$.

The conversion bias corresponding to alternative hypothetical degrees of price distortion using the IBEC rate (or "backward") method is shown in Section A of the Table. 1/ As expected from equation (4), the conversion bias is simply equal to the degree of price distortion. It is independent of the country cross rates, so the degree of conversion bias shown in columns (4) - (10) would be the same for any two or more countries that happened to be faced with the same extent of foreign trade price distortion.

The conversion bias resulting from using the country cross rate (or "forward") method is, as shown in equation (6), a function of both the degree of price distortion and a given country's cross rate between the TR and the U.S. dollar. For a given degree of foreign trade price distortion, the absolute differences in conversion bias using this approach tend to be particularly great between those CMEA countries employing valuta or statistical commercial rates and those using commercial exchange rates to value their foreign trade.

V. Concluding Remarks

This paper has developed a simplified methodology for evaluating the extent to which reported statistics on ruble trade flows may not be directly comparable to the official statistics of CMEA countries for their nonruble trade. Problems of noncomparability may exist both because intra-CMEA foreign trade prices are distorted from world market prices, and because national cross rates between the transferable ruble and the dollar may differ from the IBEC accounting exchange rate at which most intra-CMEA trade flows are initially converted from dollar prices to TR prices.

Sections II and III indicated how the conversion bias involved in revaluing ruble trade flows in terms of dollars depends on whether conversion is undertaken "backwards", using the IBEC exchange rate, or "forwards" using a country's cross rate between the TR and the dollar. Although the degree of forward conversion bias can be altered by the national authorities by adjusting the cross rate, no single cross rate can totally eliminate this bias if the average degree of price distortion (vis-à-vis world market prices) in that country's ruble imports differs from the average distortion in its ruble export prices.

Illustrative calculations of conversion bias for individual CMEA countries were presented in Section IV, for the year 1983. For plausible

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1/ CMEA member countries' trade for 1983 valued in TRs can be obtained directly from SESSEV (1984).

alternative degrees of price distortion, fairly considerable differences in conversion bias are possible for different countries. In the absence of generally agreed upon estimates of actual price distortions in intra-CMEA trade, attempted adjustment of reported statistics using the methods elaborated in this paper may not be possible. If such adjustments are eschewed, it is suggested that direct comparisons of trade values and changes in trade values and unit values as between the ruble and nonruble areas should be avoided or undertaken only with great care. 1/

1/ Drabek (1985) explores in some detail the problems that changing levels of conversion bias may cause in interpreting the trends in ruble and non-ruble trade shares of the CMEA countries.

References

Allen, Mark, "The Structure and Reform of the Exchange and Payments Systems of Some East European Countries," International Monetary Fund Staff Papers, 23 (3): 718-39, 1976.

Brada, Josef "Soviet Subsidization of Eastern Europe: The Primacy of Economics over Politics?". Journal of Comparative Economics, 9(1): 80-92, 1985.

Dietz, Raimund, "Advantages and Disadvantages in Soviet Trade with Eastern Europe: The Pricing Dimension". In Joint Economic Committee, U.S. Congress, East European Economies: Slow Growth in the 1980s, Volume 3. Washington, D.C.: USGPO, 1985.

Drabek, Zdenek, "The East European Response to the Debt Crisis: Has There Been Trade Diversion or a Statistical Abberation?", manuscript, October 1985.

Havlik, Peter, "The Scope and Structure of Czechoslovak Foreign Trade: Effects of Applying Realistic Exchange Rates". Comparative Economic Studies. 27(1): 1-19, 1985.

Hewett, Edward A., Foreign Trade Prices in the Council for Mutual Economic Assistance. New York: Cambridge University Press, 1974.

IFS, International Financial Statistics. Washington, D.C.: International Monetary Fund, 1983.

Marer, Paul, "The Political Economy of Soviet Relations with Eastern Europe". In Sarah Terry (ed.) Soviet Policy in Eastern Europe. New Haven: Yale University Press, 1984.

Marrese, Michael and Vanous, Jan, Soviet Subsidization of Trade With Eastern Europe. Berkeley: University of California Press, 1983.

_____, "Soviet Trade Relations with Eastern Europe, 1970-84". In J.C. Brada, E.A. Hewett and T.A. Wolf (eds.) Economic Adjustment and Reform in the Soviet Union and Eastern Europe: Essays in Honor of Franklyn D. Holzman, forthcoming.

RSHZ, Rocznik statystyczny handlu zagranicznego. Warsaw: Central Statistical Office, 1984.

SE, Statisztikai evkönyv. Budapest: Central Statistical Office, 1983.

SESSEV, Statisticheskii ezhegodnik stran-chlenov soveta ekonomicheskoi vzaimopomoshchi. Moscow: "Finansy i Statistka", 1984.

Van Brabant, "The Relationship Between World and Socialist Trade Prices - Some Empirical Evidence", Journal of Comparative Economics. 9 (3): 233-251, 1985.

_____, Aspects of Monetary Cooperation in Eastern Europe, forthcoming.

Vanous, Jan, "Commercial Exchange Rates of East European Countries and Realistic Dollar/Ruble Exchange Rates for Soviet Trade with Eastern Europe". In Centrally Planned Economies: Current Analysis. Washington, D.C.: Wharton Econometric Forecasting Associates, September 20, 1984.

Vanous, Jan and Michael Marrese, "Soviet-East European Trade Relations: Recent Patterns and Likely Future Developments". Mimeo, 1984.

Wolf, Thomas A., (1985a), "Exchange Rate Systems and Adjustment in Planned Economies". International Monetary Fund Staff Papers. 32(2): 211-247, 1985.

_____, (1985b), "Estimating 'Foregone Gains' in Soviet-East European Foreign Trade: A Methodological Note". Comparative Economic Studies. 27(3): 83-98, 1985.