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MAKING SENSE OF THE SOVIET TRADE SHOCK IN EASTERN EUROPE: A FRAMEWORK AND SOME ESTIMATES

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ABSTRACT

Eastern European countries have experienced sharp declines in real GDP since 1990. One of the reasons for this decline is the Soviet trade shock, deriving from the collapse of the CMEA and of traditional export markets in the Soviet Union. This paper is an attempt to quantify the magnitude of this external shock. A conceptual framework is developed to show that the shock has three distinct elements: (a) a terms of trade deterioration; (b) a market-loss effect; and (c) a removal-of-import-subsidy effect. Taking all three together, and also adding in Keynesian multiplier effects, the conclusion is that the Soviet trade shock accounts for all of the decline in Hungarian GDP, about 60 percent of decline in Czechoslovakia, and between a quarter and a third of the decline in Poland.

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1. Introduction

The decline in economic activity in the Eastern European countries in transition has been much greater than most observers had predicted at the outset. According to official figures and estimates, real GDP has declined cumulatively by 20 percent in Poland, 11 percent in Hungary, and 19 percent in Czechoslovakia in 1990-91 (Table 1.1). There is some debate over the proper accounting of private-sector production and employment, and reason to think that the official statistics may overstate the actual decline. Nonetheless, even making allowance for statistical oversight, these numbers indicate that the transition is proving more costly than anticipated.[1]

There are two potential explanations for these deep recessions. First, the stabilization programs put in place in all these countries may have been overly restrictive. Credit policies in both Poland and Czechoslovakia were particularly tight in the early phases of their respective programs (in 1990 and 1991, respectively.) One sign of overshooting is that all three countries ran unanticipated trade surpluses with the West during the first year of the new policies. Hence one possibility is that the adjustment and stabilization policies put in place were too ambitious, especially in view of the special institutional circumstances of previously-planned economies.[2]

The second explanation, which is the focus of this paper, is that the

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1. Berg and Sachs (1991) estimate the drop in Polish GDP for 1990 to have been 6.5 percent, rather than the official 12 percent.

2. On Poland, see Pinto (1991) and Calvo and Coricelli (1991). On Czechoslovakia, see Komarek (1992).

dissolution of the CMEA and the loss of Soviet markets have had a severe impact. As Tables 1.2 and 1.3 show, the enterprise sector in all three countries is heavily reliant on Soviet trade, especially in engineering industries. Before the shock, the share of engineering-sector output exported to the rouble area amounted to 28 percent and 19 percent, respectively, in Hungary and Czechoslovakia. In Poland, which has a larger economy and is less open to trade, the corresponding ratio was more than 10 percent. During 1990, but particularly in 1991, the volume of trade with the former members of the CMEA has declined substantially (see Table 1.4). In addition, the transition to dollar pricing in Soviet trade as of 1991 has implied large terms-of-trade deteriorations for these countries.

Much of this paper is devoted to laying out a framework for analyzing the consequences of the Soviet trade shock. Based on data extending through the first three quarters of 1991, I also provide some estimates of the magnitude of the income losses suffered by Poland, Hungary, and Czechoslovakia as a result of this shock. The results indicate that, even on conservative assumptions, practically all of the cumulative decline in Hungary and a very large part of the decline in Czechoslovakia can be "accounted" for by the Soviet trade shock. While the trade shock is substantial in Poland also, it "accounts" for a smaller fraction of the decline in output in this country. I will discuss the reasons for these differences below. However, it should be made clear at the outset that these calculations are based on incomplete, and in some cases, extrapolated data. Therefore, they should be taken with a grain of salt.

The reason we need an explicit framework for looking at the Soviet trade shock is that the complexities of the CMEA trade regime have led to some

confusion over the consequences of its demise. Consider the following puzzles:

• The transition to dollar pricing among the former members of the CMEA is said to have led to large increases in the cost of energy imports from the Soviet Union. Yet between 1986 and 1989, Soviet export prices for crude oil were in fact above world prices. Even in 1990, when world market prices shot up due to the Gulf crisis, Soviet export prices were only slightly below spot market prices. More to the point, world market prices in 1991 were below 1990 Soviet export prices.

• Exporting manufactured goods to the Soviet market is said to have been highly profitable, since these same goods could be sold in Western markets only at deep discounts, if sold at all. Yet enterprises often made losses on their exports of manufactured products to the Soviet Union, and had to receive transfers from the government budget to make them comply with protocol targets.[3]

• To have meaningful estimates of the terms-of-trade shock in Soviet trade, we need to know the value of this trade in dollars. Yet there exists no single, appropriate exchange rate for converting prices in transferable roubles (TR) into dollars. The possibilities vary by a factor of 7, from 0.61 TR/$ (the intra-CMEA rate for 1990) to 4.52 TR/$ (the Polish cross rate).[4]

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3. See for example Budjinski (1991, p. 149) on Poland: "[A]n overwhelming number of exporters to the CMEA countries were recipients of subsidies from the state budget. The fact that in the majority of cases the products exported to the CMEA countries could not be marketed anywhere else (mostly for quality reasons) did not lessen pressures for subsidies. In 1989 the [average] subsidy rate was 12 per cent ...."

All three puzzles are in fact related, and derive from the existence of multiple exchange rates. Poland, Hungary, and Czechoslovakia maintained internal exchange rates that valued the rouble (in terms of the dollar) considerably more cheaply than the external rate. As I will show below, the system was formally equivalent to a domestic import subsidy/export tax scheme in trade with the Soviet Union. Therefore, we have to distinguish between two distinct effects that arose from dissolution of the CMEA and the abolition of the transferable rouble: (i) a move to spot prices from the various reference prices of the past (e.g., a five-year moving average of world oil prices); and (ii) a removal of the import subsidy/export tax scheme. The first of these represents a genuine terms-of-trade shock, not because border prices of raw materials have risen, but because prices of manufactured exports have taken a big hit. The second, in itself, is a source of efficiency gain, even though the tax/subsidy scheme had its logic and its removal has caused distress in enterprises dependent on the implicit import subsidy. In addition, there is a third effect, which I will call the market-loss effect. This effect arose from the reduction in the volume of manufactured goods exported at a premium to the Soviet Union.

With regard to the appropriate dollar valuation of Soviet trade--the third puzzle above--the recognition that discrepancies between internal and external

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4. Often, a "compromise" exchange rate is selected by taking some average of these rates. See for example ECE (1991, chap. 2). I will argue below that the appropriate exchange rate is the official CMEA (IBEC) exchange rate, with adjustment for the likelihood that trade surpluses in transferable roubles will be converted into commodities or convertible currencies at a differential "exchange rate" that places a much lower value on the TR than the IBEC rate.

valuations of the rouble amount to a domestic tax/subsidy scheme helps a great deal also. Once the underlying tax/subsidy scheme is identified, we can stop worrying about the "appropriate" exchange rate. The question becomes no longer which exchange rate to use for the conversion, but what are the subsidy and taxes that stand in between domestic and border prices, the latter prices being in this case those represented by Soviet trading opportunities. This places our calculations of the costs of the Soviet trade shock on a more solid analytical footing.

2. The Anatomy of the Soviet Trade Shock

Understanding the Soviet trade shock requires understanding the mechanics of pricing under the CMEA. In this section, I sketch in simplified fashion the relevant rules that operated in Poland, Hungary, and Czechoslovakia until 1991 with respect to trade with the Soviet Union (as well as other CMEA members).[5] My focus will be on demonstrating the point noted in the introduction, namely that discrepancies between internal and external exchange rates for the transferable rouble amounted to trade subsidies and taxes of a particular sort. I will argue that the Soviet trade shock consists of three conceptually distinct effects: (i) a terms of trade effect; (ii) a removal of a domestic import subsidy; and (iii) a market loss effect.

Take first imports of raw materials from the Soviet Union. The domestic price of, say, crude oil, imported from the Soviet Union was determined in the following manner. First, the CMEA would select a reference world price (in

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5. For more details, the reader is referred to van Brabant (1987) and Wolf (1987), and the references cited therein.

dollars), in this case a five-year moving average of world market prices for oil. Then this reference price would be converted to TR by using the official exchange rate between the TR and the dollar of the International Bank for Economic Cooperation (IBEC). This exchange rate was quite close to the official rate in the USSR, but not identical because the basket of currencies on which it was based differed from that used in the Soviet Union. The IBEC rate has ranged between 0.60 and 0.75 TR/$, and stood at 0.61 TR/$ in 1990. This price in TR would then be the border price at which the oil was imported. The domestic-currency price would in turn be the TR price multiplied by the national exchange rate between the TR and the domestic currency. Hence, the domestic price (denoted p_m) would be:

$$(2.1) \quad p_m = p_m^* \times e^I_{R\$} \times e_R,$$

where p_m^* is the dollar moving-average price, $e^I_{R\$}$ is the IBEC rate (TR/$), and e_R is the national exchange rate between the domestic currency and the TR (NC/TR). This can be stated equivalently as:

$$(2.2) \quad p_m = p_m^* \times (e^I_{R\$}/e_{R\$}) \times e_\$,$$

where $e_{R\$}$ is the <u>national</u> cross-rate between the TR and the dollar (TR/$) and $e_\$$ is the national exchange rate against the dollar (NC/$).

Export prices were determined in more or less the same manner,

$$(2.3) \quad p_x = p_x^* \times (e^I_{R\$}/e_{R\$}) \times e_\$,$$

with the important caveat that manufactured exports rarely had adequate

comparators in world markets. So the border price set in TR was more or less a negotiated price. Nonetheless, we can still use this (and the IBEC exchange rate) to define an implicit dollar price at the border, p_x^*.

Note that $e_{R\$}$ is an implicit rate, for which there was no actual quotation; it is obtained by dividing $e_\$$ by e_R. The national cross rates in Poland, Hungary, and Czechoslovakia diverged considerably from the IBEC rate, valuing the rouble much less than the latter (i.e., $e^I_{R\$}/e_{R\$} < 1$). Table 2.1 shows recent cross rates in these three countries.

We also note that the external terms of trade (TOT) were <u>independent</u> of the internal cross rate,

$$(2.4) \quad TOT = p_x/p_m = p_x^*/p_m^*,$$

and were a function only of the ratio of explicit or implicit world reference prices in dollars.

With the demise of the CMEA, pricing in Soviet trade has become the same as in any other trade. So import and export prices in domestic currency are now given by:

$$(2.5) \quad p_m' = p_m^{*\prime} \times e_\$,$$

$$(2.6) \quad p_x' = p_x^{*\prime} \times e_\$,$$

where the prime indicates the post-transition domestic and border prices. (To save on notation and with no loss of generality, $e_\$$, the domestic currency exchange rate against the dollar, is assumed to remain unchanged.) The new terms of trade are given by:

$$(2.7) \quad TOT' = p_x'/p_m' = p_x^{*\prime}/p_m^{*\prime},$$

Now we are ready to analyze the consequences of the demise of the CMEA regime. Comparing (2.2)-(2.4) with (2.5)-(2.7), we see that the move to dollar pricing involves two distinct effects. The first of these is a straightforward terms of trade (TOT) effect, which is here captured by the change from p_m^*/p_x^* to $p_m^{*\prime}/p_x^{*\prime}$. Table 2.2 shows that there has been a hefty deterioration in all three countries' terms of trade in 1991.

Where is this deterioration coming from? In actual practice, the change has come about as the explicit or implicit dollar reference prices used in trade with the Soviet Union have been altered with the transition to dollar pricing. On the export side, many East European exporters are now pricing their manufactured exports using a one-to-one translation of TR prices into dollar prices; hence, a pair of shoes that was previously sold for TR25 is now priced at $25. Before the demise, TR25 had the purchasing power (in terms of imports from the Soviet Union)[6] of 25/0.61 = $41. Therefore the new price implies a cut in dollar terms of 39 percent. On the import side, changes in dollar prices have come about as the moving-average system has been abolished for raw materials and transactions began to be carried out on the basis of spot prices.

The latter change has not been particularly damaging. It is not always appreciated that since 1986, and thanks to moving-average pricing, the dollar

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6. However, trade surpluses were not necessarily redeemable in this fashion. See the discussion below on this issue.

prices of crude oil imports from the Soviet Union have tended to be higher than world market prices. As Table 2.3 shows, the collapse of world prices in 1986 left Soviet oil considerably over-priced. This situation persisted until 1990, when world prices overtook Soviet prices due to the Gulf crisis in August. However, even in 1990, the price differential in favor of Soviet oil was barely $3½ a barrel. And since world oil prices have fallen in 1991, there is little reason to believe that a significant increase in import prices has actually taken place. The deterioration in TOT has come mainly from the export side.

The second effect involved in the move to dollar pricing has been the effective unification of the cross rate as the ratio $e^{I}_{R\$}/e_{R\$}$ has gone to unity (compare [2.2]-[2.3] with [2.5]-[2.6]). As pointed out above, this does not affect the terms of trade, but simply raises in domestic currency terms the prices of both imports and exports. As we can see from (2.2) and (2.3), the gap between $e_{R\$}$ and $e^{I}_{R\$}$ had kept domestic prices of imports and exports cheap (relative to trade with the convertible-currency area). Another way of stating this is that the divergence between the internal and external exchange rates for the rouble acted just like a domestic import subsidy and export tax in rouble trade. With the disappearence of the TR, the implicit import subsidy (and export tax) in rouble trade has disappeared also.

How large were these implicit subsidies arising from the multiple exchange rate practice? Let us denote the ad valorem rate of the implicit import subsidy (and equivalently, export tax) as s. The value of s is given by $(e_{R\$}/e^{I}_{R\$})$ - 1, and can be calculated easily from data on IBEC and national cross rates. Table 2.4 shows the results for the three countries. The subsidies were very large indeed, and largest in Poland (641%!) where the

exchange rate gap was the biggest.

The practical consequences are shown in Table 2.5 for imports of crude oil. In 1990, domestic users in Poland paid less than $3 a barrel for oil imported from the Soviet Union, even though the average price paid at the border for Soviet oil was $21.83. These numbers make it clear that the increase in the domestic cost of Soviet energy imports in 1991 has come about from the removal of an implicit import subsidy (which I will call the RS effect), and not from an increase in prices charged by the Soviet Union. As such, the change is an efficiency-enhancing one, unlike the term-of-trade deterioration which is a source of impoverishment. However, as I will explain in greater detail in the next section, the import subsidy had its logic before 1991 insofar as it reduced worthless rouble surpluses in trade with the Soviet Union.

In principle, Eastern European countries operated a scheme of "equalization" taxes and subsidies designed to neutralize these price distortions. Hungary, for example, apparently levied a special tax on imports of crude oil from the Soviet Union, aimed at equalizing the domestic-currency cost of oil imports from the Soviet Union with the cost of oil imports from the convertible-currency area (Schrenk, 1990, fn. 23). In Poland, where the implicit subsidies were largest, the scheme appears to have lost by 1990 any effectiveness it previously may have had. To the extent that they were deployed at all, these equalization taxes and subsidies had arbitrary and extremely limited effects.[7] Since the analysis below takes 1990 as the base

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7. Polish budgetary statistics for 1990 show that foreign trade taxes amounted to 0.6 percent of GDP while foreign trade subsidies were 0.0 percent

year, I will ignore them altogether.

There was yet a third consequence of the move to dollar pricing. Since many of the manufactured goods sold in the Soviet market could be sold in Western markets only at deep discounts, if at all, the reduction in the volume of sales has led to the loss of rents on these exports. Some evidence on the price differentials in Soviet and alternative markets are presented in Tables 2.6 and 2.7 for Hungarian and Polish exports, respectively. In each case, a sample of foreign trade organizations were asked about the dollar prices their exports to the Soviet Union would likely fetch in Western markets. The results reveal an average discount of 45 percent for Hungarian exports and 50 percent for Polish exports. The presence of such price margins between the Soviet and Western markets renders a reduction in export volume to the Soviet Union an independent source of income loss. This effect is conceptually distinct from the TOT effect since it would operate even in the absence of any change in the dollar prices received from Soviet importers.[8] I call this the market-loss (ML) effect.

3. The Analytical Framework

As a step toward conceptual clarity and eventual quantification, it is helpful to have an explicit model that incorporates the special features discussed

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of GDP. These numbers do not leave any room for the huge equalization subsidies and taxes that would have been needed in that year, if the system had been operational.

8. As will be discussed in section 4, however, there is a certain degree of arbitrariness in practice in distinguishing between the TOT effects and the ML effects.

above. In particular, we want to track the consequences of the three effects laid out above, the TOT, RS and ML effects. Once we have such a model, the consequences of each of these three can be traced by carrying out comparative-static analysis.

We can work with a purely "real" model, as we know that the exchange rate system in rouble trade was formally equivalent to a set of trade taxes and subsidies. This allows us to ignore the exchange rate altogether, and express all external and domestic prices relative to a common numeraire, a commodity which is tradable in Western markets. We set e_S equal to unity in what follows.

We begin by dividing the archetypal Eastern European economy into two sectors. I lump into one sector all industries that import raw materials from the Soviet Union. The second sector is made up of industries that export manufactures to the Soviet Union. Of course, there is in practice some overlap between these two sectors. Also, there exist industries that can not be classified under either. But these complications make no difference to the analytical results to be derived, and I stick with the two-fold classification.

Let us denote by p_m the domestic price of oil imported from the Soviet Union. From the previous section, we know that p_m is related to the border (i.e., Soviet export) price by

$$(3.1) \quad p_m = p_m^*/(1+s),$$

where s is the implicit import subsidy discussed and calculated in the previous section. Since p_m^* and s are both exogenous, so is p_m. The domestic export price (to the Soviet Union) is similarly given by

(3.2) $p_x = p_x^*/(1+s)$,

Hence we can then express the model in terms of p_m and p_x, and do the the comparative statics on them directly (keeping in mind that they are determined by s).

We call the first (oil-importing) sector the m-sector. Its output price is taken to be fixed by arbitrage with Western markets, which is not a bad assumption in view of the recent liberalizations in trade. It does not matter whether the sector is a net exporter to the West or a net importer. Behavior in this sector is summarized by a profit function of the following sort:

$$(3.3) \quad \pi^m(1;\ w,\ p_m) = \max_{\ell^m, m} \left(f(\ell^m,\ m) - w\ell^m - p_m m\right)$$

where ℓ^m is employment in the m-sector, m is the volume of oil imports from the Soviet Union, w the wage rate, f(.) a CRS production function, and 1 stands for the fixed output price. This profit function has the usual Hotelling's lemma properties, namely:

$$\pi_1^m = f(.), \quad \pi_2^m = -\ell^m, \text{ and } \quad \pi_3^m = -m,$$

where a numbered subscript denotes a partial derivative with respect to the relevant argument.

The second sector, called the x-sector, is assumed to sell its output both in the Soviet market and in others (domestic or Western markets). The firm receives a different price for sales in these two kinds of markets, p_x and p_a respectively. We take p_a to be fixed also by arbitrage with Western markets. Further, firms in this sector are constrained to sell a certain

exogenous amount to the Soviet market. The constraint arises either because of the demand constraint in the Soviet Union (when $p_x > p_a$), or because the government forces firms to fulfill targets in trade protocols (when $p_x < p_a$). Remember that since $p_x < p_x^*$ due to the implicit export tax, there is no guarantee that exports to the Soviet Union are privately profitable even though they are socially hugely profitable.

The constrained profit function of the x-sector can then be written as follows:

$$(3.4) \quad \pi^e(p_x, p_a; w; x) = \max_{\ell^e} \{p_x x + p_a[g(\ell^e) - x] - w\ell^e\},$$

where $g(.)$ is the production function in the x-sector, ℓ^e is employment, and x stands for the exogenous export volume to the Soviet Union. $\pi^e(.)$ has the following properties:

$$\pi_1^e = x, \quad \pi_2^e = [g(\ell^e) - x] = x_a, \quad \pi_3^e = -\ell^e, \quad \text{and } \pi_4^e = (p_x - p_a).$$

We assume that the constraint always binds and that $x_a > 0$ in equilibrium.

The model is closed by the full-employment condition $\bar{\ell} = \ell^m + \ell^e$, or alternatively:

$$(3.5) \quad \pi_2^m + \pi_3^e + \bar{\ell} = 0.$$

The model has four endogenous variables, ℓ^m, ℓ^e, m, and w. These are determined by (3.5) and the three input demand equations ($\pi_2^m = -\ell^m$, $\pi_3^m = -m$, and $\pi_3^e = -\ell^e$). I have left the demand side of the economy out of the picture, as I will not need it for evaluating changes in real GDP as a result of the Soviet trade shock.

From the standpoint of real income, the appropriate valuation of GDP is in terms of world prices. Expressed in world prices, domestic value added is given by:

$$(3.6) \quad y = f(.) + p_x^* x + p_a x_a - p_m^* m,$$

or, equivalently:

$$(3.7) \quad y = \pi_1^m + p_x^* x + p_a \pi_2^e + p_m^* \pi_3^m.$$

We now differentiate this expression totally, using the resource constraint embodied in (3.5). To simplify the result, we make use of the fact that $\pi^e(.)$ and $\pi^m(.)$ are homogeneous of degree 1 in all prices. Also, we note from the first-order condition associated with (3.4) that $\pi_{24}^e = dx_a/dx = -1$ and $\pi_{12}^e = dx_a/dp_x = 0$. The final result is:

$$\begin{aligned} (3.8) \quad dy = {} & (x dp_x^* - m dp_m^*) \quad \ldots\ldots\ldots\ldots \text{ TOT effect} \\ & + (p_x^* - p_a) dx \quad \ldots\ldots\ldots\ldots \text{ ML effect} \\ & + (p_m - p_m^*)[dm/dp_m] dp_m \quad \ldots\ldots\ldots \text{ RS effect} \end{aligned}$$

where

$$dm/dp_m = - \left[\pi_{33}^m - \frac{(\pi_{23}^m)^2}{\pi_{22}^m + \pi_{33}^e} \right]$$

$$(+) \qquad (+)$$

There is a slight ambiguity in the sign of dm/dp_m which arises from general equilibrium interactions. The direct effect of an increase in the domestic price of imported oil is to reduce demand, and this is captured by the first term in the square brackets above. But as long as there is some

substitutability between labor and energy inputs (as captured by π^m_{23}), the shift towards labor raises the wage rate and encourages substitution back towards oil. We would normally expect the wage effect to play at best a dampening role, so we can safely assume that the second term in the brackets does not overpower the first (a sufficient condition for this is that $\pi^m_{33} > \pi^m_{23}$).

Equation (3.8) neatly captures the independent effects of the three aspects of the Soviet trade shock. The first (TOT) effect arises from the changes in the external (dollar) prices of exports and imports in Soviet trade. Note that the TOT effect can also be expressed as:

$$(3.9) \quad (x dp^*_x - m dp^*_m) = x(dp^*_x - dp^*_m) + (x - m)dp^*_m.$$

The first term on the right-hand side is the "pure", textbook terms-of-trade effect, while the second one represents an adjustment for unbalanced trade. The second (ML) effect captures the foregone rents from sales to the Soviet market as export volume is reduced. Notice that the relevant margin here is the gap between p^*_x and p_a, and not p_x and p_a. Even if domestic enterprises make losses on these sales, the presence of a large enough export tax ensures that these sales are socially profitable.

Finally, the removal of import subsidy (RS) effect is captured by the last term in (3.8). As mentioned before, the increase in p_m is a positive effect, and creates a benefit proportional to the decline in the volume of subsidized imports and the gap between domestic and border prices. Note however that the dm at issue here is <u>not</u> the decline in the volume of imports from the Soviet Union, but the decline in import demand by users that were previously subsidized. In this model, the two are the same. But in the real

world they need not be if previously subsidized users shift their demand to Western sources. Efficiency gains obtain only to the extent that previously subsidized users of Soviet oil reduce their total oil consumption from all sources. Hence, while the actual decline in Soviet oil deliveries to Eastern European countries during 1990 and 1991 has been substantial (some 60 percent cumulatively according to the IMF [1991]), this fact alone is a poor guide to estimating the RS benefits.

The question might be posed as to why the removal of the implicit export tax does not lead to a separate term in (3.8), as is the case with the import subsidy. The answer is that the relevant term is in fact contained in the ML effect. The presence of p_x^* rather than p_x in the ML term highlights the fact that the presence of an export tax renders the expansion of exports more profitable than would appear to enterprises themselves.

To those trained in trade theory, the RS term in (3.8) might appear at first sight to be puzzling. In a standard trade model with no price rigidities, a combined import subsidy/export tax scheme (an "appreciation of the exchange rate") simply lowers all prices (including those of non-teadables) by the same proportion, leaving relative prices unaffected and producing no resource-allocation and efficiency consequences whatsoever. The reason the situation is different here is that the import subsidy/export tax scheme is operative for trade with the rouble area, but not for trade with the convertible-currency area. Relative prices are affected vis-a-vis tradables for the Western market, and the resulting distortion in our model is captured by the change in relative prices between p_m and p_x, on the one hand, and 1, p_a, and w on the other. This distortion produces a shift in imports away from the convertible-currency area and towards the Soviet Union (and in exports in

the other direction). It encourages over-consumption of energy from subsidized sources.

However, it is also important to recognize that, in the presence of an inconvertible surplus with the Soviet Union, the implicit import subsidy does have a positive role to play. All three countries ran rouble trade surpluses with the Soviet Union in 1990. Our model effectively assumes that these rouble surpluses are redeemable in convertible currencies at the IBEC exchange rate of 0.61 TR/$--i.e., that the rouble export surplus can be converted into commodity imports at the relative price implied by this exchange rate. This is obviously false. It is not clear how these surpluses will be cleared, but it is extremely unlikely that they will be converted to dollars at anything approaching the former IBEC rate.[9] To be on the conservative side, I will assume instead that the 1990 rouble surpluses were in effect worthless.[10]

The way to incorporate this assumption in our framework is by recognizing that the effective price received for exports to the Soviet Union was below the transaction price. Hence we need to adjust p_x^* downward. Define θ as the ratio of imports to exports in rouble trade:

$$(3.10) \quad \theta = p_m^* m / p_x^* x.$$

Then the effective dollar price received in exports to the Soviet Union, denoted by $\tilde{p}_x^*$, is given by:

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9. See the discussion in Oblath and Tarr (1991, pp. 10-11) for the Hungarian case.

10. Not all trade with the Soviet Union was in roubles, and there were imbalances in dollar trade also. But these were comparatively minor, so I will ignore them.

(3.11) $\tilde{p}_x^* = \theta p_x^* = p_m^* m/x.$

We now replace p_x^* with $\tilde{p}_x^*$ in equation (3.8):

(3.8′) $dy = (x d\tilde{p}_x^* - m dp_m^*)$ ..... TOT effect

$+ (\tilde{p}_x^* - p_a)dx$ ..... ML effect

$+ (p_m - p_m^*)[dm/dp_m]dp_m$ ..... RS effect

With this adjustment, all the terms can be interpreted as before, except that the effective terms of trade is no longer exogenous, since $\tilde{p}_x^*$ can be raised by increasing the volume of imports.

An implication is that the import subsidy is on balance beneficial, as long as the surplus remains and is inconvertible. To see this, look at the welfare effect of an expansion in imports. Assuming all exogenous variables are constant ($dp_m^* = dx = 0$),

(3.12) $dy/dm = x d\tilde{p}_x^*/dm + (p_m - p_m^*).$

(+) (-)

The first term captures the effective terms-of-trade benefit of expanding imports: exports are effectively rendered more valuable since less is wasted in accummulating worthless surpluses. The second term captures the subsidy distortion. Now using (3.11), this expression simplifies to:

(3.13) $dy/dm = p_m > 0.$

Hence an import subsidy is unambiguously beneficial as long as there is an

inconvertible surplus (i.e., as long as [3.11] remains in force).

In view of this, it may appear paradoxical that we count the removal of the subsidy as a benefit (under the RS term). However, this is the proper procedure. The effective terms-of-trade benefit of the subsidy is already taken into account in the TOT term. It may help to think of the following example: suppose the transition to dollar pricing reduces p_x^* to $\bar{p}_x^*$, with no other change (save for the automatic disappearance of the implicit subsidy). This entails no loss on the TOT front, since the effective export price remains unchanged. However, there are still gains that derive from the removal of the subsidy: as (the previously subsidized) imports are reduced (now at no cost to the terms of trade), the resources saved can be put to more efficient uses.

4. Towards Empirical Implementation

For small changes, equation (3.8') tells us all that we need to know in order to quantify the Soviet trade shock. However, when the changes involved are large, as they certainly are in this case, the infinitesimal calculus can be misleading as to the magnitudes involved. For that reason, this section carries out a diagrammatic analysis in order to provide guidance as to how the framework can be quantified.

Figure 4.1 shows the situation on the export side. The horizontal line at p_a represents the opportunity cost of exports to the Soviet market. With the demise of the CMEA, export volume falls from x to x' and the effective dollar prices received from the Soviet Union fall from $\bar{p}_x^*$ to $p_x^{*\prime}$. The

total loss is the sum of the two shaded rectangles. Here, unlike in the infinitesimal case, there is some arbitrariness in distinguishing the TOT (or price) effect from the ML (or volume) effect. I choose to attribute $x(p_x^{*'} - \tilde{p}_x^*) = x\Delta p_x^*$ to the TOT effect (on the export side) and $(p_x^{*'} - p_a)(x' - x) = (p_x^{*'} - p_a)\Delta x$ to the ML effect.

The outcome with respect to imports is shown in Figure 4.2, drawn for the case where the dollar price of imports from the Soviet Union falls. The original level of imports (at the domestic price p_m) is given by m. In light of the discussion in the previous section, we distinguish between the new level of imports from the Soviet Union (denoted by m') and the new level of imports by previously subsidized activities (denoted by m_1). The difference $(m_1 - m')$ is the additional level of imports from Western sources. There are two sources of gain here: (i) the TOT effect, represented by the area EAGF, and (ii) the recaptured deadweight-loss triangle from the import subsidy, represented by the area ABC.

For empirical purposes, it is more convenient to break these effects up slightly differently, with EBJF standing for the TOT effect and GJC standing for the RS effect. It is easy to check that EBJF + GJC = EAGF + ABC. The area EBJF is given by $-m(p_m^{*'} - p_m^*)$. As for GJC, it is approximated by $\frac{1}{2}(p_m - p_m^{*'})(m_1 - m)$.

Putting all these different pieces together, the discrete approximation to the magnitude of the Soviet trade shock becomes:

$$(4.1) \quad \Delta y = x(p_x^{*'} - \tilde{p}_x^*) - m(p_m^{*'} - p_m^*)$$

$$+ (p_x^{*\prime} - p_a)\Delta x$$

$$+ \tfrac{1}{2}(p_m - p_m^{*\prime})(m_1 - m)$$

Note that this is virtually the same as (3.8'), except that the TOT effect is evaluated at base-year trade volumes, while the price margins in the other two effects use the post-shock border prices to avoid double-counting. Also, the RS effect has a ½ in front of it.

Using (3.11) and with some manipulation, our final equation reads:

$$\Delta y = p_m^* m\,[\hat{p}_x^* - \hat{p}_m^*] \quad \text{..... TOT effect}$$

$$+ [(p_x^{*\prime} - p_a)/p_x^*]\; p_x^* \Delta x \quad \text{..... ML effect}$$

$$+ \tfrac{1}{2}[(p_m - p_m^{*\prime})/p_m]\; p_m m\,[(m_1 - m)/m] \quad \text{..... RS effect} \tag{4.2}$$

where a "^" denotes proportional changes and $\hat{p}_x^* = (p_x^{*\prime} - \bar{p}_x^*)/\bar{p}_x^*$.
Note that the adjustment for worthless rouble surplus makes the Soviet TOT shock look less bad because it dampens the effective terms of trade deterioration relative to the recorded terms of trade. Equation (4.2) is the formula that I will use to estimate the effects of the Soviet trade shock.

5. The Results

Equation (4.2) points to the individual pieces of information needed to calculate the aggregate effects of the Soviet trade shock. Table 5.1 displays this information, as best as I could piece together from incomplete data sources. There is considerable uncertainty about some of these data, particularly where the terms of trade outcomes are concerned. Also, in some cases the unavailability of statistics (especially in the case of Czechoslovakia) has forced me to extrapolate from data on other countries.

Therefore these numbers should be taken with a grain of salt, and treated as tentative, until better and more complete data become available. Note, however, that when forced to make assumptions, I have generally made the assumptions that would make the Soviet trade shock appear smaller. Consequently, the results will likely present a lower bound on the magnitude of the income loss. I discuss data issues and the extrapolations more fully in the Appendix.

The TOT and RS effects are the consequence of the transition to dollar pricing and the disappearance of the transferable rouble, both of which occurred in 1991. The ML effect, by contrast, was operative in 1990 also, as the decline of import demand in the Soviet Union cut into export sales in that market. Hence our calculations for 1990 cover only the ML effect, while those for 1991 cover all three effects. The results are displayed in Table 5.2.

We note first that most of the market-loss cost was borne in 1990, since the TOT deterioration in 1991 eliminated almost all of the price advantage in the Soviet market. The cost on this account stood roughly at $1 billion for each of the three countries in 1990, but was substantially smaller in 1991. Despite the greater volume reduction in exports, the virtual disappearance of the price premium in the Soviet market is responsible for the 1991 result (see eq. [4.2]).

With respect to the terms-of-trade effect, we find that Czechoslovakia is by far the hardest hit in 1991, with a loss of $3.5 billion (compared to $1.9 billion in Poland and $0.9 billion in Hungary). Interestingly, this is neither because the measured (assumed?) terms of trade deterioration is greater in Czechoslovakia, nor because the volume of exports to the Soviet is larger. The difference arises almost entirely from the much smaller 1990

rouble surplus in Czechoslovakia compared to the other two countries. (This is captured by the higher θ for Czechoslovakia in Table 5.1.) Effectively, Czechoslovak exports in 1990 were worth more because they were transformed into proportionately greater supplies of real commmodities from the Soviet Union. The decrease in export prices consequently is more damaging in real terms. In the other two countries, much of the measured terms of trade deterioration is an illusion, since a large part of exports were paid for in worthless transferable roubles, effectively rendering export prices in 1990 so much smaller. This can be seen by comparing the adjusted and unadjusted export price increases shown in Table 5.1.

The removal of subsidy (RS) effect plays a comparatively small role, except in Poland where it amounts to $0.67 billion (making up for 36 percent of the TOT cost). The RS effect is prominent in Poland because the implicit import subsidy was so large--641 percent.[11] Hence, even though the implicit elasticity of demand for imports of energy is small (in absolute value), the effect is still non-negligible.

It might be objected that the removal of the import subsidy is a source of distress for energy-intensive enterprises, and that counting this as a benefit is not appropriate. Our calculations ignore Keynesian effects and the possibility that resources (labor in particular) may become unemployed in energy-intensive industries as a consequence of a shock that is <u>prima facie</u> positive. However, the removal of the subsidy does have offsetting positive

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11. In Hungary, the RS effect may have been even smaller than the figure reported in this table, due to the maintenance of special offsetting taxes on imports of oil from the Soviet Union in 1990.

income effects (for exporters and the government). Besides, what is the point of price liberalization in these economies if not to ensure that resources are utilized more efficiently? Discounting the benefits of the removal of a 669 percent subsidy is tantamount to saying that the existence of the subsidy had little cost to begin with. If we believe price reform to be beneficial, we must also believe that the RS effect is a source of gain.

The cumulative 1990-91 shock amounts to around $2 billion in Poland and Hungary, and $3.4 billion in Czechoslovakia. However, since the Hungarian economy is less than half the size of Poland's, as a share of GDP the shock is significantly larger in Hungary. The cumulative total amounts to 7-8 percent of GDP in Hungary and Czechoslovakia and to 3½ percent in Poland. The comparatively small figure for Poland reflects three factors: (i) the larger Polish economy is not nearly as reliant on Soviet trade as the other two (see Tables 1.2 and 1.3); (ii) with the biggest implicit subsidy, Poland has a relatively large benefit arising from the RS effect; and (iii) Poland's large TR surplus in 1990 substantially reduces the adjusted terms of trade deterioration for 1991.

It may be instructive to compare the results here to other similar calculations. Berg and Sachs (1991) present estimates of the 1991 trade shock on Poland by valuing the 1990 imports of energy and natural resources from the Soviet Union at world prices, and assuming that the manufactured exports that paid for them are now worthless. Effectively this assumes a 100 percent decline in export prices for manufactures. Nonetheless, their estimate of the net loss ($2 billion for 1991) is roughly the same for the combined TOT and ML

effects here, because the import base on which they calculate their net loss (covering crude oil, petroleum products, natural gas, crude iron ore, and iron ore) is much smaller than the imputed dollar value in Table 5.1. Oblath and Tarr (1991) estimate the income loss for Hungary to be between $1.5 billion and $2.2 bilion for 1991, based on an assumed oil price of $21 per barrel, with the lower end resulting from the assumption of worthless rouble surpluses. This is somewhat higher than the estimate here--a combined TOT and ML effect of $1 billion. Since I have relied on their estimate of the change in the terms of trade, the main difference arises from the lower quantity base imputed here. Kenen (1991) provides estimates for all three countries (as well as Bulgaria and Romania), based on 1989 trade volumes. He assumes that the terms of trade shock will come primarily from a large increase in prices of imported raw materials, with little change in the price of manufactures. However, his imputed terms of trade changes are not too different from the figures used here. Therefore, while his estimated losses are somewhat larger than those reported here, they are not vastly different.

We note that none of these studies has looked at the RS effect, which as mentioned above, plays an important role in Poland at least. Nor do they distinguish between the TOT effect and the ML effect, which as I have argued are conceptually distinct.

6. How Much of the GDP Decline Can the Soviet Shock Account For?

The appropriate way to interpret the numbers discussed above is as the real income loss <u>on impact</u> arising from the Soviet shock. These numbers

cannot be directly compared with the drops in GDP mentioned in the introduction. This is because each of these two sets of figures understates the true real income loss for a separate reason. First, our estimates of the real income loss do not take into account any Keynesian repercussions arising from domestic wage-price inflexibilities. The sharp increase in unemployment in all three countries is prima facie evidence that Keynesian multiplier effects are present. Therefore our figures must understate considerably the true income cost of the shock. Second, actual statistics of GDP declines do not take into account the direct income loss arising from the terms of trade deterioration. The reason is that GDP is a measure of output, not income. To get from GDP to gross national income, we need to adjust it by adding in the direct income effects of the terms of trade change.

Since we have separately calculated the terms of trade losses, the latter is easy enough to do. Taking Keynesian multiplier effects into account is more problematic. In principle, this requires working with detailed macroeconomic models of each of these economies, models which would be extremely unreliable during the transition even where they exist. I see no better way than simply to assume a reasonable Keynesian multiplier. A guide of sorts is provided by the textbook open-economy Keynesian model, in which the multiplier equals the inverse of the sum of the marginal saving and import propensities (1/[s+m]). With reasonable values for s and m, the multiplier would be around 2. A multiplier of 2 is also consistent with results obtained in macroeconometric models of advanced countries. Hence 2 is probably as good a guess any other.

Table 6.1 presents our cumulative figures for the shock, now multiplied by 2 so as to incorporate Keynesian effects also. The table also shows the estimated cumulative decline in gross national income (GNI) in the three countries since 1990. The second set of figures is calculated by adding the terms of trade losses to the official estimates of GDP losses. Comparing the two sets of estimates, we see that the Soviet trade shock can "explain" almost all of the decline in income (and GDP) in Hungary, and most of it in Czechoslovakia. In Poland, the Soviet trade shock "accounts" for between a quarter and a third of the cumulative decline. However, if we rely on the Berg-Sachs (1991) estimate of the 1990 fall in GDP in Poland rather than on official statistics (6½ percent rather than 12 percent), the cumulative decline would be much smaller, and the Soviet trade shock would correspondingly "explain" a substantial chunk of it.

Moreover, it bears repeating that our estimates of the Soviet trade shock probably represent a lower bound. As explained above and in the Appendix, when called to make a judgement, I have usually selected figures that would lower the costs of the shock. The terms of trade statistics I have used are on the conservative side. Also, the working hypothesis that 1990 rouble surpluses were entirely worthless has reduced the cost estimates, particularly in Poland and Hungary. Last but not least, it is possible that the Keynesian effects arising from the Soviet shock were much stronger than those I allowed for.

7. Concluding Remarks

My main objective in this paper has been to bring some conceptual clarity to the issues surrounding the Soviet trade shock in Eastern Europe. I have argued that there are three distinct "shocks" involved: a terms of trade deterioration, a market-loss effect, and the removal of an implicit subsidy on imports from the Soviet Union. Unlike the first two, the last represents a positive shock, and dampens the income loss (especially in Poland). Inappropriate characterization of these shocks may lead to inaccurate assesments of their costs.

I have argued that the discrepancies between the internal cross rate (of the rouble vis-a-vis the dollar) and the IBEC exchange rate represent an implicit import subsidy/export tax scheme in rouble trade. A recognition of this also helps with the valuation of rouble trade in dollar terms, a problem that has plagued most previous research on intra-CMEA trade. The tax/subsidy scheme implicitly contained in the internal cross rate has nothing to do with the external terms of trade. For purposes of terms of trade calculations, the appropriate dollar valuation of Soviet trade is in terms of the explicit or implicit dollar prices of Soviet exports and imports at the border (i.e., the dollar values obtained using the IBEC exchange rate). However, inconvertibility of trade surpluses does require that export prices be adjusted downwards.

Using the framework, I have also presented some estimates of the real income losses generated by the Soviet trade shock. Even without Keynesian multiplier effects, the cost has been severe. The shock can account for virtually all of the estimated decline in GDP in Hungary during 1990-91, and for most of it in Czechoslovakia. Since the Polish economy is larger and less

open to trade, the Soviet trade shock accounts for a substantially smaller part of the decline in Poland. However, the relative role played by the trade shock in Poland would be much greater if we take the Berg-Sachs estimate of the GDP decline rather than the official estimate.

Without question, much uncertainty surrounds the estimates reported here. I have tried to be conservative in my assessment of the shock, so these numbers probably represent a lower bound. Nonetheless, a more thorough accounting must await better and more complete data.

One useful check on the plausibility of my estimates is provided by the experience of Finland. This country suffered a similar external shock during 1990-91 as a consequence of the sharp reduction in its trade volume with the Soviet Union. This was the leading cause of the 6.1 percent cumulative drop in Finnish GDP over this period (see OECD, 1991a). Prior to the shock, exports to the CMEA stood at 3.4 percent of Finnish GDP, which is considerably lower than the corresponding figures for Poland and especially Hungary and Czechoslovakia. Seen from this perspective, the large losses attributed to the Soviet trade shock in the latter countries are far from being implausible.

The results have some bearing on the question of whether the gradualist strategy in Hungary has somehow done better than the shock therapy in Poland and Czechoslovakia. Taking our numbers at face value, the answer would seem that it has. The two cases of shock therapy, Czechoslovakia and Poland, both have a non-negligible part of their GDP declines "unaccounted" for by the Soviet trade shock. The implication may well be that the residual represents the excess costs of shock therapy during transition. On the other hand, even if this interpration is correct, it remains to be seen whether shock therapy merely concentrates the costs upfront, and therefore whether Hungary will not

eventually bear higher costs than Poland and Czechoslovakia in the longer run. Moreover, it should not be forgotten that Hungary has had a much longer experience with market-oriented policies. This could well be an additional reason for the relative smoothness of its transition.

APPENDIX

In this appendix, I discuss the data used in the calculations, as well as the various assumptions and extrapolations employed to fill the gaps in the statistics that were available to me.

A.1. Value of Soviet Trade at Border Prices. As suggested by the framework, the value of Soviet trade should be evaluated at border prices for purposes of terms of trade calculations. The implicit dollar prices involved in Soviet trade denominated in TR can be recovered by using the IBEC exchange rate.

The value of trade with the Soviet Union is usually available in all three countries in domestic currency. To express this in dollars, I have generally followed the following steps: (i) break up the total into two components, using information on the shares of trade that were denominated in TR and in convertible currencies; (ii) express the first component in dollars by dividing it by $(e^{I}_{R\$} \times e_R)$ (cf. eq. [2.1]); (iii) express the second component in dollars by dividing it by $e_\$$; (iv) sum the two dollar figures. Note that this procedure gives a much higher dollar figure for Soviet trade than would be the case if the internal cross rate between TR and $ was used. However, as explained in the text, the appropriate border prices are found by using the IBEC rate.

The changes in export volumes for 1990 and 1991 are taken from Table 1.4, where I assume (again to be on the conservative side) that the same figures apply for the Soviet Union as for CMEA as a whole.

A.2. Changes in Terms of Trade and Border Prices. The available data on the terms of trade for 1991 are patchy. For Poland, the Central Statistical Office (GUS, 1991) gives a deterioration of 48.2% in CMEA trade (for Jan.-Sep.). To be on the conservative side, I have used this figure to apply to Soviet trade also. For Hungary, I have used the mid-point of the estimates reported by Oblath and Tarr (1991); however, these estimates were based on very preliminary results for early 1991. For Czechoslovakia, national statistics (FSU, 1991) show an overall deterioration in the terms of trade by 27.2%, which would imply more than 100% deterioration in Soviet trade alone. This is obviously too large. On the other hand, figures reported by PlanEcon (1991) would imply a deterioration in Soviet trade of 25.6%, which is probably too low in view of the figures for the other two countries and the FSU figure. I constructed a number for Czechoslovakia based on estimated changes in dollar prices for exports and imports, as explained below.

The estimated change in dollar export prices in Soviet trade is based on the margin between export prices in the Soviet and Western markets (see section A.3 below). I assume that most, but not all, of this gap is closed with the transition to dollar pricing. The reason that some of the gap may remain is the specificity of the many products manufactured for the Soviet market, and the corresponding bilateral-monopoly situation. The Polish survey cited in the text (Danielewski, 1991) shows that Soviet dollar import prices, for manufactured products bought in the West, are typically higher than the

prices received by Polish exporters in the West for the same types of products (Table A.1). I assume that the margin between these two sets of prices are

Table A.1: Polish export to the Soviet Union

mil. TR	implicit $ value (mil. $)	in prices of Polish exporters (mil. $)	in prices of Soviet importers (mil. $)
8302.3	13610.3	6790.8	7791.9

Source: Danielewski (1991).

split in half, which implies that the transition to dollar pricing soaks up 92.6% of the price premium in Soviet markets. The percentage changes in dollar export prices of each country are then calculated by using this figure in conjunction with the data on the preexisting premia (as discussed in section A.3).

With respect to the change in dollar import prices, for Poland and Hungary it is calculated as the residual, using the changes in TOT and export prices. For Czechoslovakia, it is assumed to be the average of the figures for Poland and Hungary.

As explained in the text, the TOT and export price changes are then adjusted for the presence of rouble trade surpluses in 1990, assumed to be worthless. θ is calculated by taking the ratio of imports to exports in Soviet trade in 1990. Then the new TOT and export price changes are calculated according to the following formulas:

$$\hat{TOT}_n = (1/\theta)[\hat{TOT}_o + (1-\theta)], \qquad (\hat{p}^*_x)_n = (1/\theta)[1 + (\hat{p}^*_x)_o] - 1,$$

where the subscripts "n" and "o" denote the adjusted and original figures, respectively.

A.3. Price Premium in Exports to the Soviet Union. For Poland and Hungary, survey data exist on export price differentials in the Soviet and Western markets. I have used the figures reported in Tables 2.6 and 2,7 for these two countries. For Czechoslovakia, I have no comparable data so had to extrapolate from the other two countries. For this purpose, I have used the unit value differentials (relative to Germany) in the three countries' engineering exports to the EC (as reported in Landesmann et al. [1991]). These figures show that Czechoslovakia's exports were in between Hungary's and Poland's in terms of quality differentials, at roughly 99 percent of the two

Table A.2: Unit Value Differentials in Exports to the EC

unit value relative to German exports (1987)	Poland	Hungary	Czechoslovakia
mechanical enginnering	0.353	0.421	0.417
electrical engineering	0.480	0.591	0.497

Source: Landesmann et al. (1991).

countries' average (Table A.2). I used this proportionality coefficient to derive an estimated price premium in Soviet trade from the average premium in the other two countries' trade.

A.4. Differentials Between Domestic and Border Prices for Imports. The pre-shock differential is given by the implicit import subsidy, as shown in Table 2.4. The differential with the post-shock border price is calculated by adjusting this figure with the estimated change in dollar import prices (from section A.2 above). The value of imports of fuel and energy from the Soviet Union at domestic prices is calculated by taking the domestic-currency value of the TR component of such imports and dividing it by the national exchange rate against the dollar ($e_{\$}$). Note that this conversion implicitly uses the domestic cross rate for rouble imports, and effectively yields the subsidy-inclusive value of imports (i.e., imports at domestic prices).

A.5. Reduction in Fuel and Energy Use by Previously Subsidized Users. In Poland, the volume of crude oil imports was down by 15.6% in 1991 (Jan.-Sep. only). In 1990, 57.6% of the total volume of crude oil had come from subsidized sources (i.e., the Soviet Union). Assuming that the demand for the non-subsidized component of oil remained unchanged, the decline in the subsidized part is given by 0.156/0.576 = 27.1%. For the other two countries, I have simply extrapolated from this figure, assuming a common demand elasticity. Since the implicit subsidy was largest in Poland, this translates into much smaller quantity reductions in the other two countries.

Table 1.1: Recent Macroeconomic Developments in Eastern Europe

	per cap. GDP ($) 1991	real GDP change (%): 1990	1991	cumul.	unempl. (%) end-1991	inflation (%) 1990	1991
Poland	1800	-12	-9	-20	12	684	76
CSFR	2100	-3	-16	-19	8	15	59
Hungary	3300	-4	-8	-11	8	28	35

Sources: World Bank and national sources.

Table 1.2: Share of Rouble Exports in Total Sales: Czechoslovakia and Hungary (in percent)

	Czechoslovakia (1988)		Hungary (1989)	
	rouble exports /sales	share in total rouble exports	rouble exports /sales	share in total rouble exports
metallurgy	7.2	8.3	3.5	3.3
engineering	18.7	64.0	27.5	63.7
chemical ind	7.2	8.2	7.7	13.9
building mat.	7.2	1.9	1.4	0.4
light ind.	14.3	13.8	8.5	10.2
food ind.	1.1	1.1	5.1	8.9
Total manufacturing	10.5	100.0	12.1	100.0

Source: Calculated from Landesmann et al. (1991), Tables 8a and 8b.

Table 1.3: Share of Exports to the Soviet Union in Total Output: Poland, 1990 (in percent)

	exports to USSR /output	share in total exports to USSR[a]
energy and fuels	4.4	7.0
metallurgy	3.8	0.5
engineering	11.4	56.3
chemical ind	6.5	21.0
light ind.	1.5	3.8
food ind.	0.7	11.1
other industries	0.8	0.0
Total industry	5.0	100.0

Sources: First column from Rosati (1991), Table 7. Second column from GUS, Statistical Bulletin, November 1991.

Note: [a] For first nine months of 1991.

Table 1.4: Recent Trends in Eastern Europe's Trade
(percent change from corresponding period previous year)

	Formerly socialist econ.[a]		Market econ.[a]		Total[b]	
	1990	1991[b,c]	1990	1991[c]	1990	1991[c]
			EXPORTS			
Value ($)						
Poland	-0.4	-87.5	40.9	6.7	11.8	-1.8
Czechoslovakia	-18.9	-76.4	7.9	-1.2	-17.0	-13.3
Hungary	-17.3	-74.4	19.3	11.3	0.8	0.4
Volume						
Poland	-13.3	-44.0	40.5	19.3[d]	13.7	-5.6
Czechoslovakia	-20.1	(-50.0)[f]	15.1		-5.9	-25.0[e]
Hungary	-27.0		13.0			
			IMPORTS			
Value ($)						
Poland	-25.6	-75.9	6.3	73.9	-2.5	64.7
Czechoslovakia	-7.3	-70.6	20.5	-24.9	-7.0	-23.6
Hungary	-9.8	-51.0	14.6	38.4	-0.1	34.3
Volume						
Poland	-34.1	-45.0	2.9	89.1[d]	-17.9	41.3
Czechoslovakia	-11.5	(-33.0)[f]	34.7		6.4	-28.0[e]
Hungary	-18.0		4.0			

Source: Rodrik (1992)

Notes: [a] Dollar values are calculated by using the IBEC exchange rate between TR and $, rather than implicit national cross rates. For 1991, the former GDR is included in market economies, and growth rates are calculated accordingly.
[b] Calculated by converting national currency values to US$ at period-average exchange rates. This makes these numbers inconsistent with those for the FSE.
[c] January-September.
[d] EC only.
[e] January-June.
[f] PlanEcon estimate, for trade with Soviet Union only.

Table 2.1: Implicit Rouble-Dollar Exchange Rates, based on national rates (transferable roubles per dollar)

	Hungary	Poland	Czechoslovakia	Bulgaria
1985	1.88	1.76	1.85	0.79
1986	1.64	1.90	1.62	0.73
1987	1.73	2.28	1.48	0.67
1988	1.94	2.21	1.44	0.64
1989	2.09	2.96	1.51	0.65
1990	2.30	4.52	1.79	0.61

Source: Rosati (1991).

Table 2.2: Terms of Trade (percent change from corresponding period previous year)

	1989	1990	1991
Poland:	18.5	-17.2	-10.8 (Jan.-Sept.)
in trade with CMEA:	5.7	4.2	-48.2
Hungary:	2.8	0.1	n.a.
in trade with CMEA	3.6	7.6	-33.5[a]
Czechoslovakia:	4.3	2.3	-27.7 (Jan.-June)
in trade with CMEA:	6.1	2.5	n.a.

Sources: GUS (1991), OECD (1991b), FSU (1991).

Note: [a] Mid-point of the estimates reported for Soviet trade in Oblath and Tarr (1991), based on 1990 quantities.

Table 2.3: Import Prices for Crude Oil: World Market Prices versus Soviet Export Prices

	world price	import price from USSR		difference
	$/barrel	TR/barrel	$/barrel	$/barrel
1980	30.12	9.72	14.73	15.39
1981	33.67	12.43	17.50	16.16
1982	35.06	15.78	21.62	13.44
1983	29.64	18.09	24.12	5.52
1984	29.97	21.34	27.36	2.61
1985	28.49	22.85	28.92	-0.43
1986	18.93	23.36	32.00	-13.07
1987	18.12	20.74	30.96	-12.84
1988	17.23	17.95	28.05	-10.82
1989	18.38	15.38	23.66	-5.28
1990	25.34	13.32	21.83	3.51
1991	19.99	n.a.	n.a.	n.a.

Sources: For 1980-89, calculated from Bak et al. (1991); world price refers to light Arabic crude cif Gdynia, and import price refers to Polish imports from USSR franco border. TR prices are converted to dollars at the IBEC exchange rate. The 1990 figures are calculated from Polish volume and value statistics for imports coming from USSR and other sources. The conversion factor used is: 7.4 barrels = 1 metric ton. The 1991 world price refers to UK Brent (light).

Table 2.4: Implicit Import Subsidies in Rouble Trade (percent)

	Hungary	Poland	Czechoslovakia
1988	203	245	125
1989	222	355	132
1990	277	641	193

Source: Calculated from Table 2.1. See text for explanation.

Table 2.5: Pricing of Crude Oil Imports in Poland, 1990

Source of imports	volume of imports (mil. barrels)	domestic prices '000 zl/b	domestic prices $/b	border prices TR/$	border prices $/b
Soviet Union	55.5	27.61	2.91	13.32	21.83
Others	40.8	240.76	25.34	--	25.34
Total	96.3	117.96	12.42	--	23.32

Source: Own calculations from value and volume statistics in 1990 trade yearbook, using IBEC and Polish cross rates between TR and $.

Table 2.6: Comparison of Prices in Exports to the Soviet Union with Prices in Alternative Markets: Hungary, 1988

Exports	Actual value (1000 TR) (1)	Implied $ value using IBEC rate (1000 $) (2)	World market value (1000 $) (3)	Discount (2)-(3) ÷ (2)
Minining and elec.	42,448	70,747	38,137	0.461
Metallurgy	134,648	210,388	293,784	-0.396
Machinery	2,833,761	4,427,752	2,150,824	0.514
Chemicals	504,309	787,983	397,719	0.495
Light Ind.	498,178	778,403	525,945	0.324
Food proc.	522,612	816,581	493,089	0.396
Agr. & others	230,198	359,684	215,759	0.400
TOTAL	4,766,154	7,462,741	4,115,257	0.449

Source: Calculated from Oblath and Tarr (1991).

Table 2.7: Comparison of Prices in Exports to the Soviet Union with Prices in Alternative Markets: Poland, 1989

Exports	Actual value (mil. TR) (1)	Implied $ value using IBEC rate (mil. $) (2)	World market value (mil. $) (3)	Discount (2)-(3) ÷ (2)
Industrial	7119.1	11670.7	5751.0	0.507
Raw materials and food	1183.2	1939.7	1039.8	0.464
TOTAL	8302.3	13610.3	6790.8	0.501

Source: Calculated from Danielewski (1991).

Table 5.1: Basic Data

	Poland	Hungary	Czechoslovakia	Discussion in appendix
A. TOT Effect				
$p^*_m m$ (bil. $)	7.840	5.467	7.574	A.1
<u>unadjusted prices</u>:				
TÔT	-0.482	-0.335	-0.387	
$\dot{p}^*_x$	-0.464	-0.416	-0.436	A.2
$\dot{p}^*_m$	-0.035	-0.122	-0.079	
θ	0.687	0.824	0.949	A.2
<u>prices adjusted for worthless rouble surpluses</u>:				
TÔT	-0.246	-0.193	-0.354	
$\dot{p}^*_x$	-0.272	-0.291	-0.405	A.2
B. ML Effect				
$(p^*_x - p_a)/p^*_x$	0.501	0.441	0.471	A.3
	for 1990 calculations:			
$(p^{*'}_x - p_a)/p^*_x$	0.501	0.441	0.471	A.3
$p^*_x x$ (bil. $)[a]	12.450	8.696	9.419	
$\Delta x/x$	-0.133	-0.270	-0.201	A.1
$p^*_x \Delta x$	-1.656	-2.348	-1.893	

(continued on next page)

Table 5.1: Basic Data, continued

	Poland	Hungary	Czechoslovakia	Discussion in appendix
	for 1991 calculations:			
$(p_x^{*'} - p_a)/p_x^*$	0.037	0.033	0.035	A.3
$p_x^* x$ (bil. $)[a]	10.794	6.348	7.526	
$\Delta x/x$	-0.440	-0.450	-0.500	A.1
$p_x^* \Delta x$ (bil. $)[a]	-4.749	-2.857	-3.763	
C. RS Effect				
$(p_m - p_m^*)/p_m$	-6.410	-2.770	-1.934	
$(p_m - p_m^{*'})/p_m$	-6.151	-2.310	-1.702	A.4
$p_m m$ (bil. $)[b]	0.801	0.668	1.291	A.4
$[(m_1 - m)/m]$	-0.271	-0.115	-0.082	A.5

Source: Author's calculations. See the Appendix for explanation.

Notes: [a] Only the rouble component of exports to the Soviet Union is included.
[b] Value (in domestic prices) of fuel and energy imports from the Soviet Union.

Table 5.2: The Soviet Trade Shock: Estimates
(bil. $, unless otherwise stated)

	Poland	Hungary	Czechoslovakia
		1990	
Market-Loss Effect (ML)	-0.83	-1.05	-0.89
		1991	
Terms-of-Trade Effect (TOT)	-1.86	-0.92	-2.47
Market-Loss Effect (ML)	-0.18	-0.09	-0.13
Removal-of-Subsidy Effect (RS)	0.67	0.09	0.09
Total 1991 Shock	-1.37	-0.92	-2.51
Cumulative 1990-91 Shock	-2.20	-1.97	-3.40
1990 GDP[a]	63.6	25.2	45.6
Cumulative shock as percent of 1990 GDP	-3.46	-7.82	-7.46

Source: Author's calculations.

Notes: [a] For Poland and Hungary, based on World Bank data, with adjustment for reduction in 1990. For Czechoslovakia, official data converted at the official exchange rate.

Table 6.1: The Soviet Trade Shock Compared to Estimates of GDP Decline (cumulative, 1990-91)

	Poland	Hungary	Czechoslovakia
	(percent of GDP)		
Real Income Loss due to Soviet Trade Shock			
A. Impact effect	3.5	7.8	7.5
B. Adjusted for Keynesian effects (2×A)	6.9	15.6	14.9
Estimated Total Real Income Loss			
C. Drop in GDP	19.9	11.2	18.6
D. TOT loss	2.9	3.7	5.4
E. Drop in GNI (C+D)	22.8	14.9	24.0

Source: Author's calculations.

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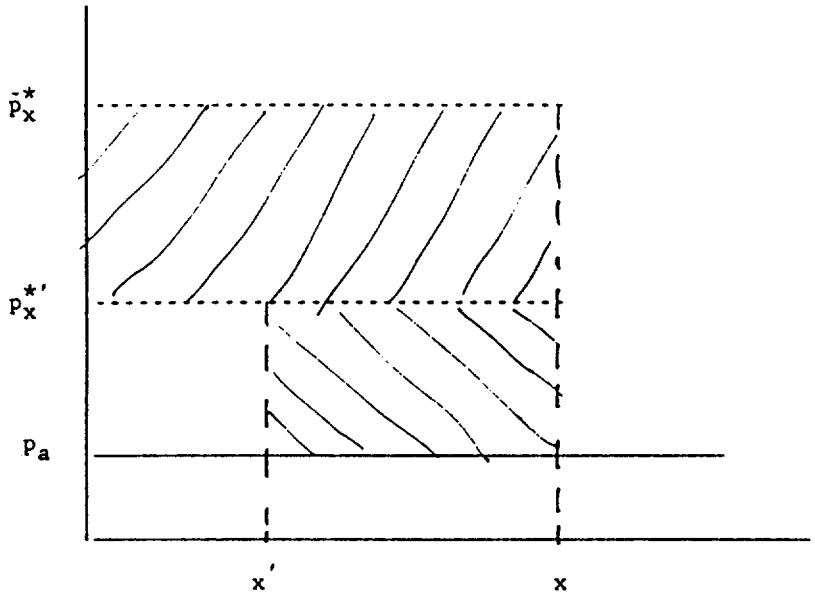

Figure 4.1

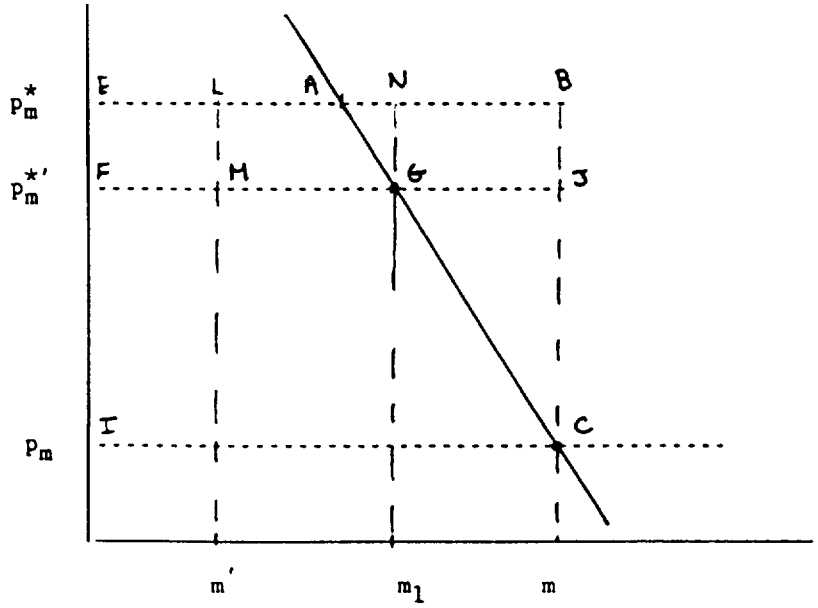

Figure 4.2