



---

## Oil Price Shock and Structural Changes in CMEA Trade: Pouring Oil on Troubled Waters?<sup>1</sup>

Elisabeth Beckmann,<sup>2</sup> Jarko Fidrmuc<sup>3</sup>

---

### Abstract

We analyse trade between countries of the Council of Mutual Economic Assistance in Eastern Europe between 1950 and 1990. Despite central planning of the CMEA, we show that trade could be explained by standard demand factors surprisingly well. We document that the oil price crisis had several repercussions on Eastern Europe. The Soviet Union as a supplier of crude oil benefited from the energy crisis in the 1970s. By contrast, the individual CMEA countries in Central Europe did not enjoy improved terms of trade with the rest of the world and the CMEA as a whole responded to the oil crisis by intensifying intra-CMEA trade and turning inwards.

JEL-Numbers: F14, C22, N74.

Key words: CMEA trade, oil price, gravity models, structural breaks.

---

### 1. Introduction

This paper analyses structural change in Soviet foreign trade with the other member countries of the Council for Mutual Economic Assistance (CMEA). The CMEA was a unique economic confederation, which was the subject for intense and often controversial analyses by both CMEA and Western economists, but also sociologists and historians. We build on this research of the CMEA and study trade in the CMEA over the entire period of its existence using modern econometric methods (panel estimation, tests of structural breaks). Our main focus is on the impact of the oil crisis on the CMEA.

Although the system of trade in the CMEA was established according to Soviet political targets in its antagonism with the US, this decision had many economic implications. The defining feature of CMEA foreign trade was that it should protect the economies from unpredictable external influences. Through the state monopoly on foreign trade central planners wanted to secure control of the channels of foreign impact. Pursuing autarky and avoiding uncertainty in this

---

<sup>1</sup> We appreciate comments by Marie-Janine Calic, Christa Hainz, Jürgen Jerger, Richard Frensch and seminar participants at the Institute for East European Studies Regensburg, December 2009, as well as two anonymous referees and editorial comments of the journal. Gundula Beckmann made valuable remarks on an earlier version. The opinions are those of the authors and do not necessarily reflect the viewpoint of the Oesterreichische Nationalbank or the Eurosystem.

<sup>2</sup> University of Economics and Business Administration and Oesterreichische Nationalbank, Vienna, Austria, e-mail: [h1065792@wu.ac.at](mailto:h1065792@wu.ac.at)

<sup>3</sup> Zeppelin University Friedrichshafen, Institute for East European Studies (OEI) Regensburg, Germany, and Mendel University Brno, e-mail: [jarko.fidrmuc@zeppelin-university.de](mailto:jarko.fidrmuc@zeppelin-university.de).

---

way, however, imposed significant costs on central planning, because among other factors it limited the ability to adjust to new conditions.

The oil crisis of 1973 underscored an emerging structural crisis in the world economy in general which was followed by a radical change from the old technological regime. At the time, Soviet press declared that the oil crisis had not affected the CMEA. However, a change in the general level of world prices, as was the case in 1973, was one of the channels identified which could impact planned economies despite their monopoly on foreign trade. Furthermore, energy played a particular role in CMEA trade as CMEA member states were dependent on the Soviet Union for energy exports. We confirm a structural break in CMEA trade in 1973.

The next section provides a brief sketch of the history of the CMEA in so far as it is relevant to structural change, i.e. drawing attention to the main phases of development and analyzing internal and external sources of structural change. Section 3 portrays and discusses the particular role of energy in intra-CMEA trade. Section 4 provides the econometric analysis of structural change in Soviet foreign trade with the CMEA countries and leads to the conclusions in the last section.

## **2. Historical Background**

Until World War II the Soviet Union was the only planned economy and pursued economic success as defined by socialism in the form of modernisation and industrialisation. Trade was a means to meet the overall plan. Imports were the means to accelerate domestic industrialisation, exports the necessary expenditure of domestic resources to obtain these imports (Smith 1993, p. 43). In reality, however, the difference between world market and domestic prices was covered by the state budget: Isolation ultimately created macroeconomic disequilibria.

After World War II Communist regimes were set up in all Eastern European countries that fell under the Soviet sphere of influence. The central planning system was imposed according to the Soviet model across these states despite great differences in economic preconditions. In addition to refusing Marshall Aid, none of the Eastern European states participated in international economic organisations, established after the War, such as the IMF.

In early January 1949, an article in Pravda reported the establishment of the CMEA. Its founding members were the Soviet Union, Bulgaria, Czechoslovakia, Hungary, Poland, and Romania. Albania joined in February 1949 and the GDR in September 1950. Three more countries outside Europe joined much later: Mongolia in 1962, Cuba in 1972, and Vietnam in 1978. From 1965 onwards Yugoslavia had associate status. In the announcement of its foundation the CMEA explicitly distanced itself from the Marshall Plan, which it saw as violating national sovereignty. The Pravda article stressed the equality of all CMEA

---

members, and stated the aims of this new organization rather vaguely as an increase in economic cooperation and mutual aid (International Arts and Sciences Pr., 1974).

In contrast to other economic confederations the CMEA was unique in its structure, consisting as it did of one superpower and several small countries at very diverse levels of economic development. Its member countries had fairly low levels of mutual trade before World War II, so that the CMEA's establishment entailed a considerable redirection of trade flows from the pre-war West-orientation.

Integration within the CMEA was initially very limited (Kaser, 1969, Wiles, 1969). Joint CMEA activities amounted mainly to the unification of statistical reporting systems, collecting members' plans and recording trade (Smith 1983, p. 174). Member states were encouraged to aim for economic autarky and to pursue economic development according to the Soviet model, i.e. rapid industrialisation with the main emphasis on heavy industry. The Eastern European economies achieved very high annual growth rates – on average 23.5% between 1947 and 1950 (Zwass 1989, p. 24). As in the Soviet Union, relocation of labour from agriculture to industrial production and exploitation of domestic raw materials were the foundation for growth. Owing to this extensive industrialisation a radial pattern of bilateral trade developed with the Soviet Union in the centre as key supplier of energy and raw materials and importer of industrial products. The East European economies were not integrated with each other through this pattern of trade.

The CMEA only began its active existence after the death of Stalin. Opposition movements and the open protests which erupted then were in part driven by economic grievances. Subsequent discussions on how to reform the economy and measures undertaken could be broadly summarized as an attempted change from extensive industrialisation to intensive development but varied a great deal across countries. In consequence to Eastern European "crises", especially the Polish and Hungarian ones in 1956, the planning systems of the CMEA member states became much more diverse and more difficult to unite in one economic organisation.

The CMEA from the 1950s onwards also began a reform process designed to intensify intra-CMEA relations. Initial measures – the abolition of reparations and improvement of terms of trade – reduced the share of the economic burden carried by Eastern Europe. Subsequent reforms had the goal of greater integration within the CMEA leading to greater efficiency through the division of labour and specialisation of countries according to natural endowments and ultimately establishing a trading pattern which would genuinely integrate the partners. However, in contrast to market economies the CMEA did not rely on comparative advantage. In the absence of markets, the aims of the CMEA had to be achieved by administrative measures.

---

With the CMEA Statutes or Charter of 1959 reform of the rudimentary institutional structure of the CMEA was initiated.<sup>4</sup> Joint production projects were the second major reform effort aimed at integrating the CMEA. For example, the “Basic Principles of the International Socialist Division of Labour” of 1962 saw coordination of national plans as the primary means for achieving the division of labour. The second major joint action programme, the “Comprehensive Programme for the Further Extension and Improvement of Cooperation and the Development of Socialist Economic Integration” adopted in 1971, placed the emphasis on “integration” of the socialist bloc instead of on the division of labour (Zwass 1989).

Gorbachev’s coming to power in 1985 did not mark a sharp turning point in CMEA reforms either. Broadly speaking, reforms of the foreign trade system under Gorbachev were aimed at streamlining administrative and operative mechanisms and improving bureaucratic efficiency. The establishment of joint ventures was permitted and so called “free enterprise zones” established (Smith 1993, p. 127). The connection to the central planning system and the state monopoly on foreign trade were left untouched. Nevertheless, Gorbachev’s new foreign policy of pursuing reconciliation with the West was important for CMEA relations. Eastern Europe and with it the CMEA had lost its priority status.

In summary, none of these reforms, aimed at radical permanent change; rather they were designed as a continuous reform process with far-reaching goals and development plans for up to 20 years and a smooth increase of foreign trade. In particular, they were never designed to end central planning and the state monopoly on foreign trade.

This fundamental decision to disallow the market to operate as a resource allocator required that the CMEA had to develop its own pricing system. The CMEA based its prices on international free market prices, and converted these into ‘transferable roubles’. The transferable rouble was a notional, non-convertible currency unit which was used only for the settlement of accounts in CMEA trade. Goods were divided into hard and soft goods. Hard goods were raw materials and products for which the quality and price on the world market was known. Soft goods were manufactured products, which varied greatly in quality and prices were not easily determined by identifying a comparable product on the world market. The actual price of a traded good was established in bilateral bargaining agreements. Prices for one and the same good could vary a great deal between bilateral trade agreements. Overall analyses of the CMEA

---

<sup>4</sup> The council meeting was established as the highest authority, supplemented by the executive committee and CMEA international organisation committees, standing sectoral committees, and the CMEA secretariat with its headquarters in Moscow. In addition to these coordinating institutions two banks were set up. The International Bank for Economic Cooperation was established in 1962. This Bank was designed as an international clearing bank. In 1970 the International Investment Bank was established. The CMEA members contributed capital to this bank according to their share in Intra-CMEA trade. One function of this bank was to provide investment credits for joint production projects.

pricing system conclude that hard goods tended to be under-priced and soft goods over-priced. The fact that trading profits or losses could not ultimately be established remained a source of conflict. Both Western economists and Soviet and East European planning officials estimated the loss or profit of CMEA member countries using various methods, and reaching highly divergent results. Among these controversies, the one about the energy price charged by the Soviet Union which evolved around Marrese and Vanous (1983) – addressed in more detail in the next section – even survived the existence of the CMEA itself (Brada, 1993).

Until 1991 there were 6 different systems of establishing prices for intra-CMEA trade based on world market prices, but these changes never touched the essence of the pricing system. At the 45<sup>th</sup> meeting of the CMEA in January 1990 in Sofia (immediately after the beginning of economic reforms in all Eastern European countries) the inherited institutional framework of the CMEA was viewed as a barrier to future developments and unanimous agreement reached to switch all trade to hard currency trade. A commission was instituted which would oversee this fundamental restructuring of the entire CMEA. In the end, the dissolution of the CMEA was precipitated even faster than the member states may have foreseen in 1990. All trade was converted to hard currency by the beginning of 1991.

### **3. The Energy Crisis and its consequences for the CMEA**

As described above, CMEA trade was characterized by a radial pattern of trade with the Soviet Union in the centre as the main provider of raw materials and energy. The rapid industrialisation pursued in Eastern Europe and the quasi war-like preparations during the Cold War necessitated an extensive use of energy and energy resources. In the 1950s coal was the predominant energy source (68%), this share dropping to around 20% during the 1960s and 1970s (IMF, 1991, p. 183). As the emphasis in industrial production began to change, oil and to a lesser degree gas became more significant as energy sources, as well as gaining significance as raw materials for industrial production. Eastern European states, especially Poland and Czechoslovakia, were initially net coal exporters to the Soviet Union. By the early 1960s, partly due to the shift in the composition of energy consumption, they had become dependent on the Soviet Union for oil and gas (Balmaceda 2004, p. 163). In 1973, the smaller CMEA member states were receiving between 80 and 90% of their overall oil imports from the Soviet Union. By the mid-1960s, moreover, readily accessible Soviet resources were beginning to be depleted and extraction had to be moved to remoter regions of Siberia. The cost of exploration and extraction in these regions was much higher and the distance of transportation sharply increased even within the Soviet Union from an average of only 80km in 1970, to 1910km in 1980, and to 2350km in 1988 (Smith 1993, p.9). The cost of energy, therefore, had been on the agenda of the CMEA for a while before the oil crisis.

---

As all other prices, prices for raw materials were established in the bilateral bargaining system, with the prices for fuel and raw materials generally below world market prices. The oil crisis sharply augmented the difference between the world market and intra-CMEA price levels. The price increase on the world market radically improved the terms of trade for the Soviet Union in relation to Western countries (Marer et.al. 1992, p. 208). The subsequent increase in hard currency revenue contributed to the Soviet economy's stability at a time when Western economies were in shock. None of the other CMEA member states, however, could "smooth" their domestic economic problems due to improved terms of trade with the West.

In reaction to the oil crisis, the so-called Bucharest principle of fixed prices was amended in 1975 to a 5 year moving average. This meant a distinct though slightly delayed and smoother increase in prices for energy in the CMEA. The East European CMEA member states had different options to react to this: Firstly, increase purchases from non-CMEA suppliers, or secondly, increase domestic extraction and improve energy efficiency. In relation to the Soviet Union, they could thirdly increase their exports<sup>5</sup> to the Soviet Union to compensate for higher raw material prices and thus achieve a balanced import-export ratio (see Figure 1 for actual development). Alternatively they could run up a deficit with the Soviet Union, or increase participation in extracting and transporting Soviet fuels.

It has been a matter of great controversy whether the Soviet Union used energy prices as a policy tool in bilateral negotiations already before the energy crisis and afterwards shielded some countries more than others from the sharp increase in oil prices. Orthodoxy had always assumed that terms of trade in intra-CMEA trade had been favourable to the Soviet Union, that the Soviet Union had been exploiting other CMEA members and that it was able to do so because of its military power. Marrese and Vanous (1983) sparked off a debate arguing that the Soviet Union was providing implicit trade subsidies to the rest of the CMEA. They argued that the commodity structure of trade was unfavourable for the Soviet Union in that the Soviet Union exported hard goods and received soft goods in return, and that the pricing of this trade added to the disadvantage because the Soviet Union could have earned a much higher price for its raw materials on the world market.

The debate continued even after the CMEA had ceased to exist. The crux of the debate was calculating the cost of trading within the CMEA. Using disaggregate trade data for Hungary, Poland, and the Soviet Union, Marrese and Wittenberg (1992) compare goods prices which were traded both within the CMEA and with Western countries. Like Marrese and Vanous (1983) they interpret the estimated subsidy as a sign that the Soviet Union maximized its

---

<sup>5</sup> This means that oil price increases caused higher exports of CMEA countries to the Soviet Union in order to achieve balanced trade. Similar effects are documented for Finland by Tolonen (1988).

---

utility function incorporating military, political and ideological as well as economic variables. In short, that this “implicit subsidy” was a deliberate policy pursued by the Soviet Union in the Brezhnev era.

Holzman and Brada, on the other hand supported the “customs union hypothesis”. As Brada (1993) argues, the “subsidies” resulted from the fact that the CMEA was a customs union. In pursuing autarky from the rest of the world, this customs union imposed import and export controls and only traded with the rest of the world when demand could not be met or supply absorbed within the CMEA. The “subsidies” were costs which arose by not trading on the world market according to comparative advantage (Marrese and Wittenberg, 1992, p.3). Lavigne (1984) argues along similar lines when she states that the “subsidy” was not deliberate but rather a result of the price-setting mechanisms of intra-CMEA trade.

Both the “subsidy” and the “customs union” proponents were criticized on methodological grounds regarding the choice of comparable world market prices and the quality discount factor introduced in estimating the soft goods prices. However, the very wording of “subsidy” implies overall benefits and losses of the trading partners. This is, of course, a much broader issue, which would need to take both dynamic and static efficiency losses into consideration. Ultimately, such an analysis would have to take into consideration the fact that the planning system did not exist in the CMEA member states before World War II and would need to hypothesise an alternative path of development according to market principles and liberalized trading mechanisms.

These hypothetical analyses are clearly beyond the scope of econometric estimation and we will not attempt to present a conclusion the above controversy. The debate serves to illustrate the central role of energy in CMEA trade and justifies analysing the effect of the oil price crisis on trade.

#### **4. Econometric Approach to Analysis of the CMEA Trade and Oil Price Shocks**

Looking at the entire period of the CMEA’s existence, our empirical analysis will seek to address the following two questions: How did trade in the CMEA develop and what was the effect on its members? How did the oil price crisis affect the CMEA?

##### **4.1 Data**

The estimation of the empirical trade equations uses yearly data from 1950 to 1990. Trade flow data are taken from statistical yearbooks of the CMEA countries.<sup>6</sup> These data in national currency units are converted into current US

---

<sup>6</sup> Soviet Union: Ministerstvo Vnešnej Torgovli SSSR, Planovo-ekonomičeskoe Upravlenie: Vnešniaia torgovlia SSSR, Moscow annual issues.

---

dollars using the official exchange rate. Especially during the first years, however, data are not always internally consistent. For the years 1950-1969, therefore, data are taken from Marer (1972), who adjusted these trade data of the individual CMEA countries into consistent time series. The year 1991 is omitted from the data series, as trade was changed to convertible currencies and overall virtually collapsed. Romania and the GDR are omitted from the sample as they are both exceptions in intra-CMEA trade: Romania, opposed what it perceived to be attempts at imposing CMEA over national interests and had unilaterally withdrawn from CMEA by the late 1960s. The GDR's trade pattern differed considerably from other CMEA members because of its trade with West Germany, therefore, we exclude the GDR from estimations.

Figure 1 shows trade of the CMEA countries. It confirms several stylized facts discussed above. First, trade with the USSR dominated CMEA trade. Second, bilateral trade was highly balanced. Third, CMEA trade with the USSR expanded in the 1970s, but then stagnated and declined later. Fourth, trade among the small CMEA4 countries behaved differently from trade of these countries with the USSR. Finally, the CMEA trade with the USSR dropped already at the end of the 1980s, that is, before the dissolution of the CMEA.

The general quality of the data from socialist economies has been the subject of criticism both before and after the collapse of communism. The data is, however, the only one available and therefore has been widely used, bearing in mind the possible distortions. The country-specific estimations use the largest possible sample for each country. Correspondingly, the sample starts approximately in 1950/1953 and ends in 1988/1990. GDP data in international 1990 Geary-Khamis dollars are taken from Maddison (2003). In further estimations oil prices are added as an additional variable. Yearly nominal prices for oil in US dollar are taken from InflationData.<sup>7</sup> For the purpose of the estimation all data are in logarithms.

---

Bulgaria: Nacionalen Statističeski Institut: Statističeskij godišnik na Narodna Republika Bălgarija, Sofia, annual

Czechoslovakia: Statistická ročenka Československé socialistické republiky, Prague, annual issues.

Hungary: Hungarian Central Statistical Office: Statistical Yearbook, Budapest 1970-77, 1981-90, data for 1978-1981 taken from: Vienna Institute of Comparative Economic Studies: Comecon Data 1989, Vienna 1990.

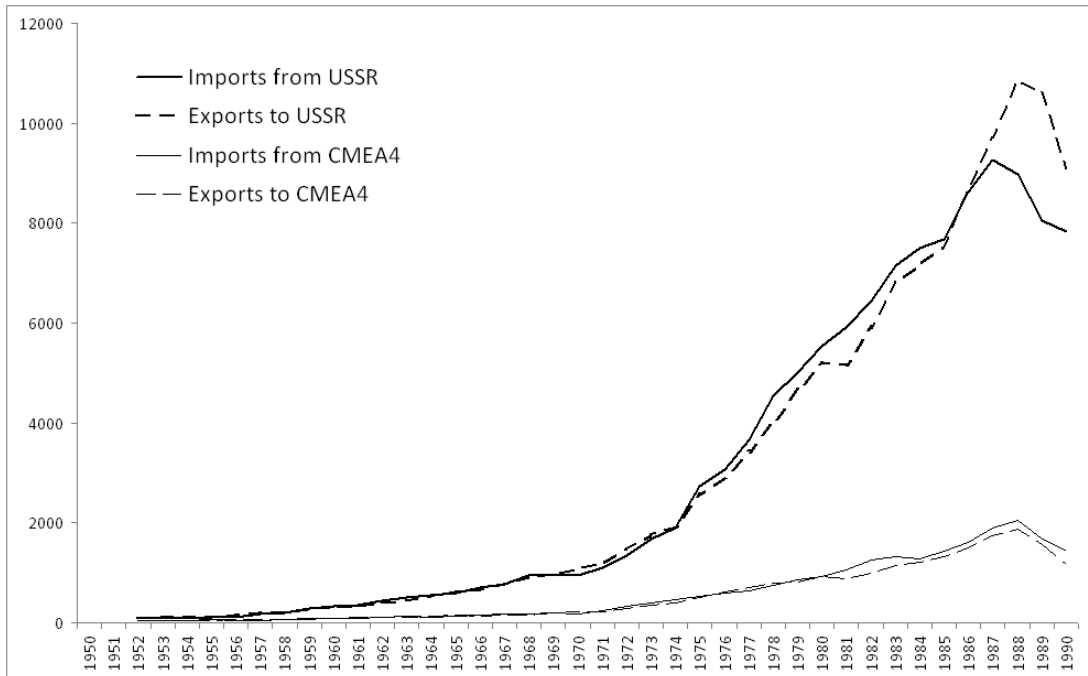
Poland: Główny Urząd Statystyczny: Rocznik statystyczny, Warsaw, annual issues.

<sup>7</sup> Inflation Data, Historical Crude Oil Price: [http://www.inflationdata.com/inflation/Inflation\\_Rate/Historical\\_Oil\\_Prices\\_Table.asp](http://www.inflationdata.com/inflation/Inflation_Rate/Historical_Oil_Prices_Table.asp), last accessed: 13/07/08.

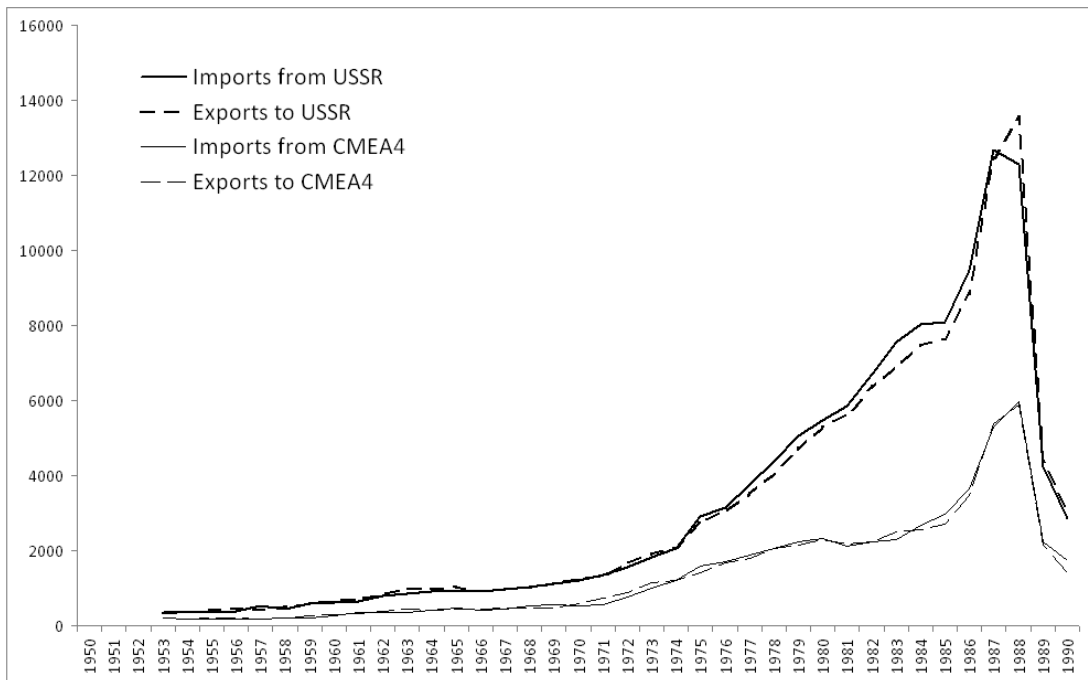


Figure 1: CMEA Trade, USD Million

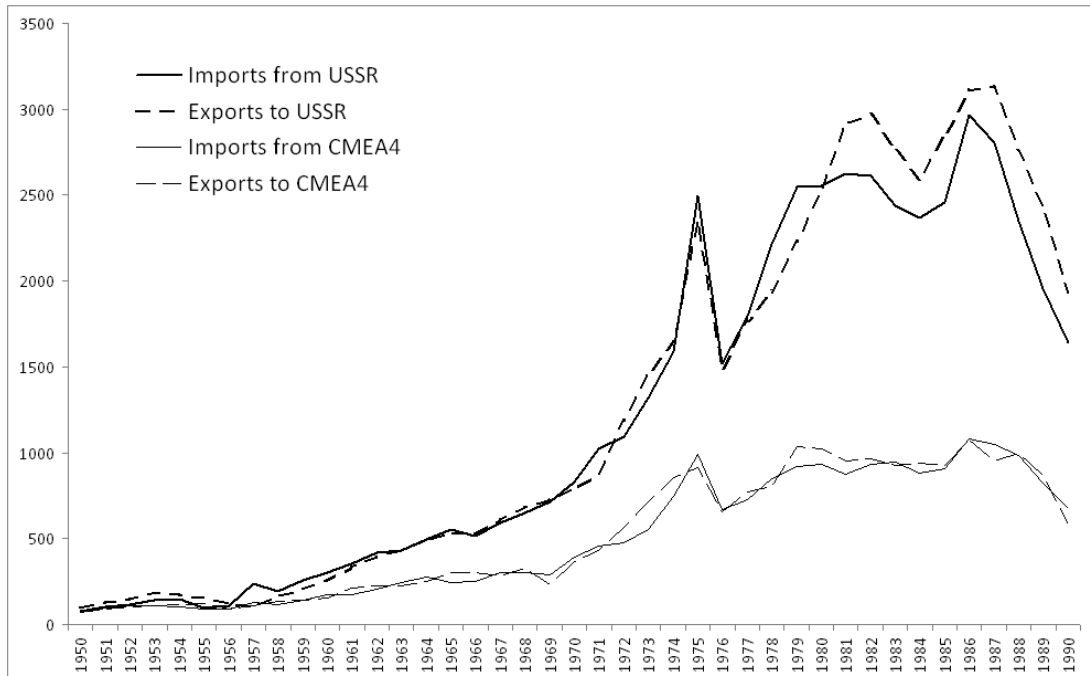
Bulgaria



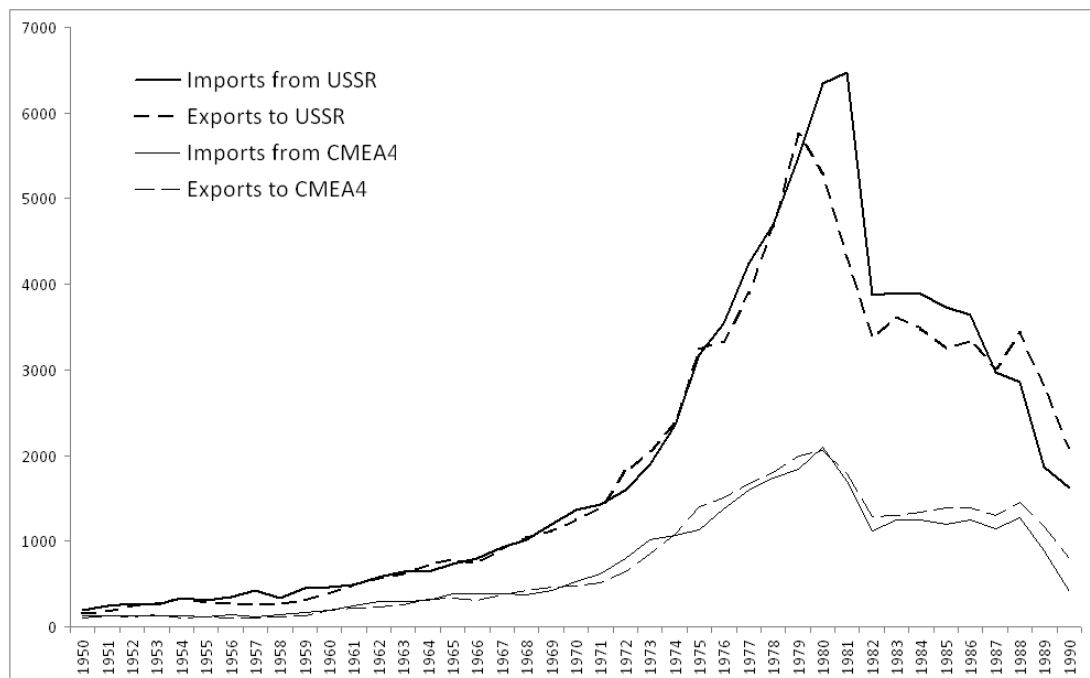
Czechoslovakia



## Hungary



## Poland



Note: CMEA4 – Bulgaria, Czechoslovakia, Hungary and Poland.

## 4.2 Econometric Specification

Gravity models were originally proposed by Linder (1961) and Linnemann (1966). They were constructed similarly to the law of gravity in physics; hence, they were also often criticized as an a-theoretical approach to trade analysis. Only after more than four decades of intensive use, they received a sound theoretical foundation by Anderson and van Wincoop (2003). They were often used for modelling trade between Eastern European countries (e.g. De Benedictis et al., 2005). Econometric analysis proxies force of gravity with trade flows and mass with the trading partners' GDP. In their analysis of structural change in Austrian trade with CMEA Fidrmuc et al. (2008) explain exports by income prospects through real GDP and terms of trade. However, terms of trade data are not available for all CMEA countries during the whole historical period. Therefore, this omitted variable will be dealt with by time effects.<sup>8</sup>

We will estimate a gravity model with panel data for 5 CMEA countries, the Soviet Union and Bulgaria, Czechoslovakia, Hungary, and Poland (CMEA4) from 1953 to 1990. We will first analyse an overall panel with 20 cross-sections and then test these results on a reduced panel with 4 cross-sections for the Soviet Union's exports only. Distance is omitted as a variable from the estimation but can be controlled for by fixed effects regression in panel data. Baldwin and Taglioni (2006) argue that gravity models should be estimated using nominal trade data with time and country-specific dummy variables. Estimation of the gravity model will therefore use nominal trade data and three sets of time- and country-specific dummy variables:

$$x_{it} = \beta_1 y_{it}^{cmea} + \sum_{t=1954}^{1990} \gamma_t dxsu_{it} y_{it}^{cmea} + \sum_{t=1954}^{1990} \delta_t dxcm_{it} y_{it}^{cmea} + \sum_{t=1954}^{1990} \phi_t dcm_{it} y_{it}^{cmea} + \beta_0 + \alpha_i + \varepsilon_{it} \quad (1)$$

where  $x_{it}$  represents exports from the Soviet Union and CMEA4,  $y_{it}^{cmea}$  stands for the GDPs of the countries of destination of the exports.  $DXSU$ ,  $DXCM$  and  $DCM$  are the sets of time- and country-specific dummies: A set of yearly dummy variables for exports from the Soviet Union to CMEA4 ( $DXSU$ ), a yearly dummy variable for exports from CMEA4 to the Soviet Union ( $DXCM$ ) and a yearly dummy variable for exports among CMEA4 countries ( $DCM$ ). Each of these variables is defined for individual years, e.g.  $DXSU70$  will take on the value one for exports from the Soviet Union to CMEA4 in 1970, otherwise be zero, and

<sup>8</sup> Imports are not estimated for statistical reasons: In panel data, the demand-oriented variable for imports (GDP of the importing country) is the same for every cross section and shows too little variance. Trade in a planned economy aimed to be largely balanced, allowing us to draw conclusions about import development from export analysis.

$DXCM70$  will be one for exports from each of the CMEA countries to the Soviet Union in 1970, otherwise zero.<sup>9</sup>

Examining the possibility of a structural break in exports of the CMEA countries in the mid 1970s, we applied a modified Chow test for a break at an unknown date. The QLR statistic is computed over a trimmed subset of the sample from 1958 to 1985 with two restrictions, both for the overall panel with 20 cross sections and for individual country panels with 4 cross sections each. The results, which are available upon request from authors, confirmed a structural break around 1975.

To test results from the gravity model and a structural break in exports, our analysis proceeds with country-specific export demand models. This reflects that all CMEA countries negotiated individual bilateral agreements. These models use panel data with four partners for each of the five countries in the above model. The following equation is estimated,

$$x_{it} = \beta_0 + \beta_1 y_{it}^{cmea} + D75^b + D75 y_{it}^{cmea} + \alpha_i + \varepsilon_{it} \quad (2)$$

where  $x_{it}$  denotes exports,  $y_{it}^{cmea}$  is the GDP of the countries of export destination,  $\alpha_i$  are fixed effects, which capture omitted variables that vary across states but are constant over time. We consider a structural break in 1975, which corresponds to the oil price crisis.  $D75$  and  $D75^b$  are dummy variables, which should capture the structural change indicated by gravity model results.  $D75$  is equal to zero up to 1974 and takes on the value of one afterwards. Similarly,  $D75^b$  takes on the value of one for 1975 and 1976 only, and zero otherwise. The former dummy variable explains the long-run effects of different trade regimes, while the latter covers possible short-term effects during the regime change. The equation is estimated using period SUR standard errors and co-variances, which reduces the autocorrelation of residuals.

To analyse the nexus between the change in export demand and world energy price increase, an additional variable, world oil price, is added to the estimations. Stijns (2003) uses world energy prices in a gravity model to analyse the Dutch disease hypothesis. Korhonen and Ledyeva (2008) document the link between trade and oil price in former Soviet Union countries. Oil price is added both to equation (1) and equation (2). The non-interacted dummy variable is dropped from equation (2) as it is multicollinear with oil prices.

---

<sup>9</sup> In order to avoid multicollinearity problems, the estimation includes the time- and country-specific dummy variables as interaction variables only.

---

### 4.3 Results of Empirical Analysis

The results of the estimations of equations (1) and (2) for the CMEA panel and all individual countries of the sample are summarized in Table 1.

We can see that income of the importing countries is a significant determinant of trade. Actually, this is quite a surprising result given the planning system in the CMEA countries. Moreover, the coefficients are comparably high in relation to results reported for standard OECD countries (usually close to one).<sup>10</sup> This can be explained by an excessive orientation of these countries to the CMEA and the isolation of these countries. It is also interesting to note that income elasticity of Soviet exports to other CMEA countries was especially high. The comparably high income elasticities are likely caused by low efficiency of communist economies and their high energy intensity. Only Bulgaria and Poland showed slightly higher trade effects.

The income elasticities of Soviet Union become slightly lower if oil price is included in the estimation (see Table 2). High oil prices created higher demand for Soviet energy exports. This biases upward the income elasticities for the Soviet Union, if oil prices are not included in the estimation.

The dummy and the interacted dummy variables which should capture structural change in exports in intra-CMEA trade are significant at the 1% level for all countries, except for Hungary. The oil price crisis had two different effects on CMEA trade. On the one hand, trade intensity declined during the oil price crisis, as indicated by the coefficient for  $D75^b$ . On the other hand, the signs for coefficients of the interacted dummy variable and income in the individual CMEA countries are positive, which means that trade reacted more strongly to economic developments in the target markets.

---

<sup>10</sup> Unity income elasticity corresponds to equal distribution of demand between home and foreign products.

Table 1: Intra-CMEA Exports, structural break 1975

Variable	CMEA <sup>a</sup>	Soviet Union <sup>b</sup>	Bulgaria <sup>b</sup>	Czechoslovakia <sup>b</sup>	Hungary <sup>b</sup>	Poland <sup>b</sup>
<i>GDP</i> <sup>CMEA</sup>	1.33***	2.21***	2.70***	1.68***	2.15***	2.36***
<i>D75b</i>		-0.61***	-0.45***	-0.43***	-0.02	0.26***
<i>D75 GDP</i> <sup>CMEA</sup>		0.10***	0.07***	0.07***	0.02**	0.03***
<i>intercept</i>	-10.46***	-17.71***	-27.70***	-14.13***	-20.72***	-22.29***
Adjusted R <sup>2</sup>	0.97	0.97	0.99	0.96	0.98	0.97
Observations	760	164	156	152	155	155
Sample	1953-1990	1953-1988	1955-1988	1956-1988	1953-1988	1953-1988

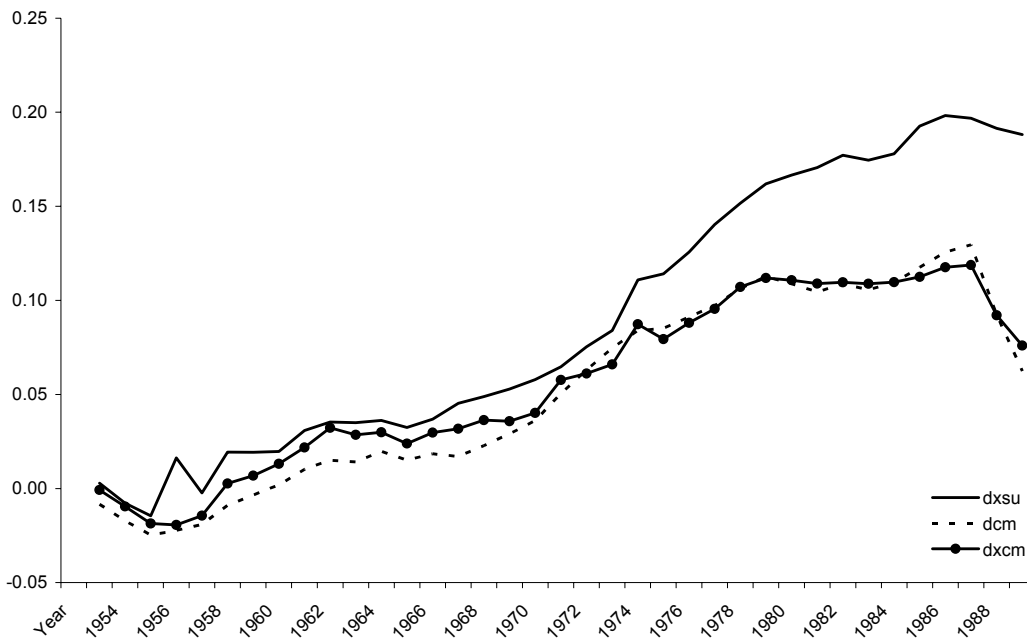
Note: The dependent variable is defined as exports of individual CMEA countries. \*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level, respectively. *a* – Panel of all CMEA countries according to equation (1). The coefficients of dummy interaction variables are reported in Figure 2. *b* – Panel for the individual CMEA countries according to equation (2).

Table 2: CMEA Trade and World Market Oil Price

Variable	CMEA <sup>a</sup>	Soviet Union <sup>b</sup>	Bulgaria <sup>b</sup>	Czechoslovakia <sup>b</sup>	Hungary <sup>b</sup>	Poland <sup>b</sup>
<i>GDP</i> <sup>CMEA</sup>	1.10***	2.10***	2.66***	1.63***	2.06***	2.21***
<i>D75 GDP</i> <sup>CMEA</sup>		0.04***	0.04***	0.05***	-0.01	-0.01
<i>Oil</i>	1.21***	0.31***	0.15***	0.14**	0.20***	0.28***
<i>intercept</i>	-9.23***	-16.95***	-27.44***	-13.77***	-19.86***	-20.84***
Adjusted R <sup>2</sup>	0.97	0.97	0.98	0.96	0.97	0.98
Observations	760	164	156	152	155	164
Sample	1953-1990	1950-1990	1952-1990	1953-1990	1950-1990	1950-1990

Note: The dependent variable is defined as exports of individual CMEA countries. \*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level, respectively. *a* – Panel of all CMEA countries according to equation (1). The coefficients of dummy interaction variables are not reported. *b* – Panel for the individual CMEA countries according to equation (2).

Figure 2: Gravity Model Coefficients of Dummy Interaction Variables



Note: Results for interaction terms (year-specific output elasticities) as specified in equation (1). DXSU – coefficient of dummies for exports from the Soviet Union to CMEA4, DXCM – coefficients of dummies for exports from CMEA4 to the Soviet Union, DCM – coefficients of dummies for exports among CMEA4 countries. Dummy variables are significant from 1968 for DXSU, from 1969 for DXCM and from 1971 for DCM.

Figure 2 plots coefficient values from the regression (1) of the three dummy variables interacted with the GDP of the importing countries over the years. As all variables are in logarithms, the coefficients can be interpreted as the time-varying components of output elasticities:<sup>11</sup> The results show that the oil price crisis influenced the demand for exports from the Soviet Union more than the export demand for other CMEA countries. This matches with the fact that the Soviet Union was at the centre of the CMEA trading pattern and the largest trading partner for all CMEA member countries. Demand for exports from the CMEA4 to the Soviet Union was initially larger than that for exports from CMEA4 to other CMEA4, but reached a very similar level from the early 1970s onwards. Thus, it can be seen that between 1973 and 1975 there was an unusually sharp increase in the elasticity of Soviet exports (DXSU). In relation to the early 1950s in 1975 Soviet exports had increased by 12% - with a 3% increase from 1974 to 1975. The increase in Soviet exports continued until 1987 (21%). Soviet exports then began to decline. The sharp increase in DXSU around 1975 is mirrored partly in DXCM (dummy variable for exports from CMEA4 to the Soviet Union) with a 9% increase from the early 1950s – 2.3% from 1974 to

<sup>11</sup> In particular, an increase of GDP by 1 percent caused trade growth by reported coefficient.

---

1975. Exports from CMEA member states to the Soviet Union, however, did not continue to increase but rather levelled out after 1980 to a maximum of only 11% above the initial level and then decreased. DCM (dummy variable for exports between CMEA4) shows a much smoother development: An overall increase of 8.5% from the early 1950s and 1% from 1974 to 1975. To sum up, the coefficients show that trade activity picks up after 1956 then develops more slowly to increase sharply around 1975. Towards the end of the existence of the CMEA there is a marked difference between output elasticities for Soviet exports and for CMEA4 exports.

Altogether, analysis of exports of the five CMEA member countries from 1950 to 1990 confirms that there was a structural break in CMEA trade during this time and this can be associated with the oil crisis.

After an initially “dormant phase”, trade activity increased after the death of Stalin simultaneously with other politically motivated reforms. The energy crisis resulted in an increase in trading activity among CMEA member states. The response to the crisis was to increase trade among socialist countries, i.e. to turn inwards and attempt to withdraw from the world market, to aim for greater autarky from the world market. There was a switch from autarky in individual communist states to autarky of the bloc. Interestingly, the phase of turning inwards was of limited duration with regard to the CMEA4. The Soviet Union continued a high level of exports to CMEA4, thereby possibly trying to support and keep together its sphere of influence. Results indicate, however, that by the early 1980s interest in CMEA trade from the part of the smaller member states began to decline and fell sharply by 1986 already (see also Figure 1). This corresponds to opening-up of Eastern Europe during the Gorbachev perestroika period.

The effects of the energy crisis were not uniform across countries. The higher level of elasticities (Figure 2) for exports from the Soviet Union suggests that the Soviet Union was the dominant energy exporter and strengthened its central position after the energy crisis.

The effect on the Soviet Union was different to that on CMEA4. Table 1 shows that trade elasticity increased more in the Soviet Union (increase by 8 percentage points) after 1975 than in any other CMEA country. Figure 2 confirms that the energy crisis had different repercussions on Eastern European trade than on Soviet trade.

Hungary, as far as the statistical analysis is concerned, was not significantly affected by the oil price crisis during the 1970s. There are various possible reasons for this “immunity” of Hungary. Firstly, it might well be that change, even though it occurred, happened much more gradually in Hungary’s case. Secondly, Hungary was the most liberalised economy of the CMEA4, which could have had the effect of a quicker, compensating response of the domestic economy. For example, Hungarian energy consumption was lowest in



---

comparison to the other countries. Moreover, Hungary received a 700-million-ruble credit from the Soviet Union to cover the increased cost of oil imports between 1976 and 1980 (Stone 1996, p. 55). Correspondingly, Hungary was possibly less affected by oil price crisis than developed economies.

In general, however, individual country results do not give reason to confirm that the Soviet policy was to shield one of the CMEA members more than another from the effects of the energy crisis, which could have lent support to the Marrese and Vanous (1983) arguments discussed in section 3.

Adding oil price as a variable to the overall gravity model in equation (1) and the individual countries' demand models in (2) confirms that world oil prices are a significant determinant of internal exports of the CMEA countries.<sup>12</sup> Our results (see Table 2) confirm that oil prices are a significant determinant of exports between CMEA countries. For Hungary, the interacted dummy variable hypothesising structural change in 1975 remains not significant, as in the estimation of the demand model without oil prices. In Poland, the interacted GDP variable becomes insignificant. However, oil prices are significant for exports of both countries, which confirms the importance of the oil shock for these two countries, as well. For all other countries, both oil prices as well as the interacted dummy variable remain highly significant. Coefficient values in comparison to the demand model results without oil prices are approximately halved. With the exception of Poland, the coefficient for the oil price is highest for the Soviet Union. The oil price crisis contributed to the inward orientation of the CMEA trade. Correspondingly, world oil prices have significant and positive effects on CMEA trade, because CMEA countries had to balance their trade with the Soviet Union (Tolonen, 1988).

## 5. Conclusions

Econometric analysis of Soviet foreign trade with the CMEA countries confirmed that there was a structural break in intra-CMEA trade around the first energy crisis. The change in energy policy in the CMEA, however, was not in the form of radical restructuring. It was characteristic of the time where the Soviet Union had entered a phase of "stagnation". The response to the energy crisis in the form of "turning inwards" could be interpreted as one last attempt by the Soviet Union to shield itself and the states under its influence from external influences. From the perspective of the smaller states, one could argue that this policy – if only for a limited time – met national economic interests for cheaper oil. Ultimately, however, it delayed necessary more radical reforms, which smaller member states might have realized when they began to turn away from the

---

<sup>12</sup> Adding oil prices to the estimation seems to distort coefficients for the time- and country-specific dummies. The reason for this could be that oil price change over the years is correlated with the time dummies, even though these are added to the equation only as interacted dummies.

CMEA by the mid 1980s already. The change in 1973, therefore, was not one of successful restructuring but one preceding the disintegration of the CMEA.

## References

- Anderson J. E., van Wincoop E. (2003) 'Gravity with gravitas: A solution to the border puzzle', *American Economic Review*, **93**, pp. 170-192.
- Baldwin R., Taglioni D. (2006) 'Gravity for Dummies and Dummies for Gravity Equations', *Working Paper*, **12516**, National Bureau for Economic Research.
- Balmaceda M. M. (2004) 'Der Weg in die Abhängigkeit. Ostmitteleuropa am Energietropf der UdSSR', *osteuropa*, **9-10(54)**, 162-179.
- Ben-David D., Papell D. H. (1997) 'Structural Change and International Trade', *Discussion Paper*, **1568**, Centre for Economic Policy Research.
- Brada J.C. (1993) 'Implicit trade subsidies within the CMEA: Comment', *Economic Systems*, **17(3)**, 233-239.
- De Benedictis L., De Santis R., Vicarelli C. (2005). 'Hub-and-Spoke or else? Free trade agreements in the 'enlarged' European Union', *European Journal of Comparative Economics*, **2(2)**, 245-260.
- Fidrmuc J., Kaufmann S., Resch A. (2008) 'Structural breaks of Austrian foreign trade with Eastern Europe during the early 1970s', *Empirica*, **35(5)**, 465-479.
- IMF (1991) *A Study of the Soviet Economy*, volume 3, International Monetary Fund, Washington.
- International Arts and Sciences Pr. (1974), *Soviet Statutes and Decisions. A Journal of Translation: Socialist International Organizations: COMECON*, 9,1.
- Kaser M. (1965) *Comecon: Integration Problems of the Planned Economies*, Oxford University Press, Oxford.
- Korhonen I., Ledyeva S. (2008) 'Trade Linkages and Macroeconomic Effects of the Price of Oil', *Discussion Paper*, **16**, Bank of Finland, BOFIT, Institute for Economics in Transition, Helsinki.
- Kramer J. M. (1990) *The Energy Gap in Eastern Europe*, Lexington Books, Toronto.
- Lavigne M. (1984) 'The Soviet Union inside Comecon', *Soviet Studies*, **35(1)**, 135-53.
- Maddison A. (2003) *The World Economy: Historical Statistics*, OECD, Paris.
- Marer P. et al. (1992) *Historically Planned Economies. A Guide to the Data*, International Bank for Reconstruction and Development / The World Bank, Washington, D.C..
- Marer P. (1972) *Soviet and East European Foreign Trade, 1946-1969. Statistical Compendium and Guide*, Indiana University Press, Bloomington and London.
- Marrese M. (1993) 'Implicit Trade Subsidies within the CMEA: Reply', *Economic Systems*, **17(3)**, 241-245.
- Marrese M., Vanous J. (1983) *Soviet Subsidisation of Trade with Eastern Europe: A Soviet Perspective*, Institute of International Studies, University of California, Berkeley.
- Marrese M., Wittenberg L. (1992) 'Implicit trade subsidies within the CMEA: A historical perspective', *Economic Systems*, **16(1)**, 1-32.
- Smith A. (1993) *Russia and the World Economy. Problems of Integration*, Routledge, London and New York.
- Smith A. (1983) *The Planned Economies of Eastern Europe*, Croom Helm, London.

- Stijns J.-P. (2003) *An Empirical Test of the Dutch Disease Hypothesis Using a Gravity Model of Trade*' available at: <http://129.3.20.41/eps/it/papers/0305/0305001.pdf>, last accessed 21 June 2009.
- Stone, R. W. (1996) *Satellites and Commissars. Strategy and Conflict in the Politics of the Soviet-Bloc Trade*, Princeton University Press, Princeton, New Jersey.
- Tolonen Y. (1988) 'Some macroeconomic consequences of trade with centrally planned economies.' *Journal of Comparative Economics*, **12(3)**, 345-361.
- Wiles P. J. D. (1969) *Communist International Economics*, Oxford: Blackwell.
- Zwass A. (1989) *The Council for Mutual Economic Assistance. The Thorny Path from Political to Economic Integration*, Armonk and Sharpe, New York and London.