Specialization Agreements in the Council for Mutual Economic Assistance

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Keith Crane, Deborah Skoller

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PREFACE

This report provides an overall assessment of the role and effectiveness of specialization and cooperation agreements within the Council for Mutual Economic Assistance, CEMA. The work was undertaken as part of a continuing research program in International Economic Policy, the principal focus of which is the interface between international economics and national security issues, within RAND's National Security Research Division. The present report is designed to assist analysts in tracing international and interindustry ties among the countries of the European CEMA. By focusing on a single policy instrument, specialization and cooperation agreements, it attempts to provide a better understanding of some of the successes and failures of the organization over the past few decades.

An in-depth investigation of these agreements in the motor vehicle industry in the CEMA is reported in companion RAND Note N-2575, *Specialization and Cooperation Agreements Within the Motor Vehicle Industry of the Council for Mutual Economic Assistance*, by Deborah Skoller and Keith Crane, February 1988.

SUMMARY

This report assesses the effectiveness of specialization and cooperation agreements in increasing economic integration and achieving other policy goals of the Council for Mutual Economic Assistance, CEMA. Specialization and cooperation agreements are the primary policy instrument employed in CEMA to implement specialization in the production of manufactured goods, especially machinery and chemicals. These agreements are treaties under which one of the participating countries agrees to satisfy the needs of the group for a particular product and the other (nonspecializing) countries agree to either limit or stop production of the product.

Specialization agreements are designed to encourage countries to develop a comparative advantage in the production of particular commodities by constructing plants that exploit economies of scale, by developing technical expertise through learning by doing, and by concentrating research and development in the industry of specialization. These agreements were created to surmount barriers to specialization arising from the system of trade in CEMA. Countries find it difficult to specialize without such agreements, because each country bilaterally balances its trade flows by commodity group. This leads to wide product assortments and little specialization. Policymakers hoped that by signing agreements designating countries as specialized producers, greater specialization could be encouraged.

Specialization agreements first appeared in CEMA in the early 1950s. Agreements were made in ferrous metals and bearings in 1956, but they did not become important until the late 1960s. In 1968, shortly after the opening of its Volga automobile plant, the Soviet Union signed a series of bilateral agreements with Hungary, Bulgaria, and Poland whereby these countries agreed to manufacture parts for automobiles produced in the new plant. In 1969, one of the most important agreements, the Multilateral Governmental Agreement on the Development, Production and Application of Electronic Data Processing Equipment, was signed, leading to the creation of an integrated CEMA computer industry.

A major campaign to sign specialization agreements began after the signing of the Complex Program on Integration in CEMA in 1971. By the mid-1970s, the number of agreements had risen from a few tens to several hundreds. Trade in products falling under specialization agreements increased from less than 1 percent of total intra-CEMA trade in 1970 to more than 20 percent by 1976.

The Soviet Union is the motivating force in most multilateral specialization agreements. It participates in almost all of these agreements, which frequently follow Soviet policy decisions to target an industry for domestic development.

Some of the smaller, more industrially advanced East European countries participate much more actively in bilateral specialization agreements than does the Soviet Union. Because of their limited domestic markets, these countries probably have more industries that cannot exploit economies of scale. They may therefore feel more pressure to eliminate inefficient production lines than the Soviets, and thus they initiate more agreements.

The organs of CEMA play an important role in the elaboration of specialization agreements. For example, the Standing Commissions, organized by industry, work out concrete recommendations concerning specialization in particular industrial sectors and facilitate necessary additional investments. The Intergovernmental Commissions on Economic, Technical and Scientific Cooperation play the primary role in drawing up and implementing specialization agreements. These bilateral commissions exist between every pair of countries in CEMA.

The evidence that specialization agreements have significantly contributed to economic integration is weak. A statistical analysis of changes in trade flows following the signing of specialization agreements provided strong evidence for an increase in economic integration in only 11 cases out of 103. In 32 cases, the hypothesis that specialization agreements increase the level of economic integration could be rejected. Although some increases in the percentage of output traded or consumption imported occurred after the signing of specialization agreements, trade flows fluctuated widely. Specialization agreements appear not to provide states with a buffer during times of recession; rather, participating countries often are quick to reduce imports or exports during periods of austerity despite the existence of agreements. Because specialization agreements frequently fail to provide reliable sources of supply, CEMA governments do not rely on them fully, but often seek alternative sources.

Specialization agreements do not appear to have induced marked increases in the share of components in CEMA trade. They often act as a drag on technological innovation despite the technical superiority of many specialized products over the domestically produced goods they replace. Finally, specialization agreements have not contributed to the multilateralization of trade flows. **In short, specialization agreements have not been successful in achieving many of the policy goals for which they were designed.**

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We would like to thank Kent Osband and Steven Popper of The RAND Corporation for their careful reviews and numerous excellent suggestions. We would also like to thank Paul Marer of Indiana University for sharing materials and suggestions. Scott A. Bruckner, Claude Daley, Miguel Garcia, Nora Monk, and Anna Slomovic of The RAND Corporation and Andrzej T. Jarmoszko of Arizona State University also deserve thanks for their assistance in gathering and summarizing research materials.

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I. INTRODUCTION

The Council for Mutual Economic Assistance, CEMA,[1] has been in existence for more than thirty-eight years. During this time, East European and Western scholars have created an enormous body of literature on the structure and history of the organization.[2] Yet many questions about CEMA remain unanswered: In particular, how do the instruments used to pursue its economic policy goals work in practice? To what extent do these instruments actually affect the allocation of resources?

One of the primary goals of CEMA has been to promote regional self-sufficiency while increasing efficiency and reducing technological disparities with the West. CEMA policymakers have chosen specialization as the route to this goal. Specialization supposedly enables CEMA countries to exploit economies of scale and concentrate research and development funds so that they are more effectively employed. Yet, after more than three decades, we remain uncertain about the extent to which CEMA has been able to induce member countries to specialize so as to attain these goals.

This report seeks to answer these questions with regard to a particular policy instrument, specialization agreements. The authors hope that this analysis of a single policy instrument will provide greater understanding of how CEMA functions and will facilitate evaluation of the effectiveness of the organization over the past few decades.

The report also addresses the question of the role and importance of the Soviet Union in CEMA. Bilateral economic ties between East European countries and the Soviet Union have been much stronger than economic ties among the East European countries themselves. Specialization agreements may be an exception. We compare Soviet

[1]The discussion in this study is confined to the European members of CEMA: Bulgaria, Czechoslovakia, the German Democratic Republic (GDR), Hungary, Poland, Romania, and the Soviet Union.

[2]See Sandor Ausch, *Theory and Practice of CMEA Cooperation*, Akademiai Kiado, Budapest, 1972; Kalman Pecsi, *The Future of Socialist Integration*, M. E. Sharpe, Inc., Armonk, N.Y., 1981; Edward A. Hewett, *Foreign Trade Prices in the Council for Mutual Economic Assistance*, Cambridge University Press, London, 1974; F. L. Pryor, *The Communist Foreign Trade System—The Other Common Market*, George Allen and Unwin, London, 1963; Vladimir Sobell, *The Red Market: Industrial Co-operation and Specialization in Comecon*, Gower, Hants, England, 1984; Josef M. van Brabant, *Bilateralism and Structural Bilateralism in Intra-CMEA Trade*, Rotterdam University Press, Rotterdam, 1973; and P. J. Wiles, *Communist International Economics*, Blackwell, Oxford, England, 1968.

and East European involvement in initiating and fostering specialization agreements to test this hypothesis.

DEFINITIONS

Specialization Agreements

Specialization agreements are treaties signed between two or more countries within CEMA under which one (or more) of the participating countries agrees to specialize in manufacturing a specified product to satisfy not only its own needs, but also those of the other participants. The nonspecializing countries agree to either limit or eliminate production of the product to be imported from the specializing country. Specialization agreements are designed to exploit economies of scale and accelerate technological advances by concentrating production and research and development efforts.

This definition is consistent with those of other scholars, both Eastern and Western. Chenchikovsky (1975), the Deputy Chief of the Department of Cooperation with CEMA Member Countries in the Ministry of Foreign Trade of the USSR, defines specialization agreements as follows:

> Agreements on production specialisation and co-operation . . . make it incumbent on a willing country to put out a specific product for a long-term period. This country undertakes to guarantee the product's high technical and economic level and to carry out the required research and design work. A country specialising in a certain product must meet the other countries' needs in it in agreed volumes, whereas the other country undertakes neither to produce nor to develop this product in the future.[3]

Sobell (1984) defines specialization agreements as formal agreements to organize production of a product by one country so that it will partially or fully satisfy the needs of another (nonspecializing) country. How the product is to be supplied is often left vague and may be agreed upon in parallel with the production agreement or in a supplementary agreement. The nonspecializing country agrees to satisfy its demand for the product by importing from the specializing country, although it does not have to satisfy total demand through those imports. The specializing country also agrees to organize the production of spare parts, services, assembly work, or training of personnel

[3]S. Chenchikovsky, "Specialisation and Cooperation of Production in the CMEA Member Countries," *Foreign Trade* (Moscow), No. 7, 1975, pp. 24–28.

for the nonspecializing country, as well as to supply technical documentation and other information.[4]

Cooperation Agreements

Specialization agreements are closely related to another policy instrument called cooperation agreements. Cooperation agreements involve two enterprises from different countries in the production of a single commodity. One enterprise usually supplies the other with components. Cooperation agreements may involve joint development work, sharing designs, sales networks, parts supply, joint operation of service networks, etc. They are usually signed by the heads of branch ministries or associations.

Specialization and cooperation agreements differ in that cooperation stresses direct relations between producers, whereas specialization does not. Nonetheless, the two types of agreement are frequently intertwined. For example, Hungary specializes in the production of buses, providing several CEMA countries with all or some of their buses, but the Soviets supply the front axles for these buses through a cooperation agreement. Hungary also supplies the Volga auto works, a Soviet enterprise, with components for the manufacture of Lada cars, through a cooperation agreement.[5] The Soviet Union sells complete cars to Hungary in exchange. However, the sale of cars appears to fall under a specialization agreement. Given these close linkages, it is not surprising that communiqués following sessions of the Council, the highest official institution within CEMA, and articles by East European economists tend to lump the two into the same phrase, "specialization and cooperation agreements," with no attempt to distinguish between them.

Another complication in differentiating between specialization and cooperation agreements is the lack of openly published agreements. In the course of the literature survey for this project, we were unable to find the text of a single agreement printed in either Soviet or East European journals. The agreements are classified information in CEMA. For these reasons, we make little attempt to differentiate between the two in this study.

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[4]Sobell, 1984, p. 11.

[5]"MGM Automation Works: Telemechanical Systems for Pipelines, Instrument Panels for Lada Cars," *Hungarian Foreign Trade*, No. 2, 1976, pp. 40–43.

APPROACH

This report explains why CEMA uses specialization agreements. It describes how they fit into the CEMA trading system and function with respect to other policy instruments employed within CEMA. It also discusses the characteristics of the agreements, their extent and composition, and the mechanisms through which they are prepared and implemented. The report assesses the effectiveness of these instruments in achieving the goal of increasing CEMA economic integration. It concludes with a discussion of the benefits and drawbacks CEMA member states have encountered using specialization and cooperation agreements.

Despite the absence of publicly available texts of specialization agreements, they are described and analyzed in detail in the commercial and economic literature of the CEMA countries. Much of the material used in this report is drawn from a directory of specialization and cooperation agreements compiled by The RAND Corporation into a computerized database using these sources. The directory includes the title of each agreement (when available in the literature), when it was signed, the countries and products involved, and a short summary of any other information pertinent to the agreement. Agreements were culled from articles in the commercial press of the CEMA countries, most notably *Czechoslovak Foreign Trade, Foreign Trade* (a Soviet publication), *Hungarian Foreign Trade, Romanian Foreign Trade, Handel Zagraniczny (Polish Foreign Trade),* and *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, the official bulletin of CEMA. The report also draws on a companion study of specialization agreements within the motor vehicle industry.[6]

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[6]Deborah Skoller and Keith Crane, *Specialization and Cooperation Agreements Within the Motor Vehicle Industry of the Council for Mutual Economic Assistance*, The RANI Corporation, N-2575, February 1988.

II. WHY DOES CEMA USE SPECIALIZATION AGREEMENTS?

PROBLEMS IN INTRA-CEMA TRADE

Neither the European Community (EC) nor the European Free Trade Association (EFTA), the other two large economic associations in Europe, use specialization agreements. In Europe, at least, these policy instruments appear to be unique to centrally planned systems. They have been created to solve specific problems inherent in CEMA trade.

One of the fundamental features of centrally planned economies is the domination of the preferences of the central authorities in determining the allocation of resources. These preferences often diverge from those of the citizenry. Policymakers in centralized economies are generally unwilling to use markets and indirect economic instruments to impose their preferred pattern of resource allocation on the economy because of ideological reasons, especially the potential emergence of large rents in favored sectors which could lead to undesired changes in income distribution. They find it more expedient to allocate resources through the direct allocation of physical quantities. To enforce financial equilibrium and to preserve a pattern of wage differentials preferred by the leadership, prices are controlled.

The resulting prices often do not equilibrate supply and demand; they fail to reflect relative scarcities. Given the opportunity, private citizens would exploit the differences in prices and supply by exporting goods with low domestic prices and importing goods with high prices. To prevent this arbitrage, the central authorities have created a state-owned monopoly of foreign trade; all trade flows through state-owned institutions. These institutions, in concert with the planning commissions, determine import and export quantities administratively.

The central authorities need instruments to steer these institutions so that central objectives are implemented. The most important of these external instruments is the foreign trade plan, which stipulates what is to be traded over the course of a year. Bonuses tied to the fulfillment of export plan targets, import quotas, and a blanket prohibition on trade other than through foreign trade organizations under the supervision of the Ministry of Foreign Trade make it possible to implement this plan. These methods of control forestall arbitrage and chan-

nel resources according to planners' preferences, rather than those of consumers or enterprise managers.

On world markets, the completion of the foreign trade plan depends to great degree on the success of the foreign trade organizations in marketing the country's products, and also on changes in demand and relative prices. In practice, hard currency export targets are frequently not attained. Within CEMA, some of these problems are mitigated by a second instrument, annual trade agreements. These agreements form the basis for trade within CEMA. They state the quantities, prices, and rough delivery dates of major trade items and quotas for other product groups. Decisions on these issues are made during annual negotiations over the agreements. The treaties have legal status in the signatory countries, so they become part of the annual plan. Export targets and prices in the plans are legally binding on enterprises, although actual penalties for noncompliance are usually less than the law would indicate. Most enterprises that fail to complete deliveries are able to invoke *force majeure* clauses.

Because an alternative market—the world market—exists, trade negotiators have an incentive to buy or sell on the market that gives them the greater payoff. This has translated into pressure to make relative prices in CEMA similar to those on world markets. However, in the interest of price stability, which facilitates planning, and the well-being of those countries that benefit from discrepancies in relative prices, CEMA does not use world market prices. Currently, prices are supposed to be set on the basis of five-year moving averages of world market prices, with some adjustments made for transportation costs and "speculative" world market price movements. CEMA members argue that this system increases price stability and makes planning easier.

Many of the manufactured goods traded in CEMA do not have easily determined world market prices. Price negotiations often result in prices on traded items which cover the manufacturer's domestic costs but which have little relation to world market prices.[1] This practice leads to wide divergences between intra-CEMA prices and those on world markets and even between the prices of exports to two different CEMA countries.

Not surprisingly, given this state of affairs, foreign trade personnel try to limit exports of "hard" goods, i.e., goods whose prices are low relative to world market prices, and increase exports of "soft" goods, i.e., goods with relatively high prices, in order to maximize gains from

[1]Josef M. van Brabant, *Socialist Economic Integration: Aspects of Contemporary Economic Problems in Eastern Europe*, Cambridge University Press, London, 1980.

trade within this system. The converse is true of imports. The result is a situation in which trade tends to be balanced bilaterally, and trade in goods of similar degrees of "hardness" also tends to balance, because countries are unwilling to suffer the implicit losses of exporting "hard goods" for "soft."[2] For example, exports of ball bearings are balanced with an equal volume of imports of ball bearings between most CEMA countries, and exports of food are balanced with an equal volume of food imports. The result is a pattern of trade which van Brabant (1973) has termed *structural bilateralism.*

Because of this system of trade and because enterprise managers in these countries respond to incentives that tend to be linked to fulfilling output quotas rather than profits, there are few effective mechanisms to induce changes in industrial structure in CEMA in response to changes in comparative advantage. The system fails to encourage countries to specialize in what they produce best, because specialization implies unbalanced trade flows within categories, which is anathema to the system.

SOLUTIONS

Economic Policy Goals

One of the purposes of CEMA is to mitigate this problem. The organization is charged with the task of increasing economic cooperation. As defined in the *Basic Documents of CEMA*, published by the CEMA Secretariat, the organization's goals are:

> to promote—by means of uniting and coordinating the efforts of the country-members of the Council—the further deepening and perfection of cooperation and development of socialist economic integration, the systematic development of the national economy, the acceleration of economic and technological progress in these countries, the increase of the level of industrialization of the countries with a lesser developed industry, the uninterrupted growth of the productivity of labor, the gradual drawing together and equalization of the level of economic development, and the continuous advance of the welfare of the country-members of the Council.[3]

CEMA faces several obstacles in the effective pursuit of these goals, the most important of which is probably the near absence of decen-

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[2]The Soviet Union has been an exception. It has been willing to trade hard goods, especially oil, for soft goods from Eastern Europe and to run large trade surpluses with the East European members of CEMA.

[3]*Osnovnie Dokumenty Soveta Ekonomicheskoy Vzaimopomoshchi*, Moscow, Vol. 1, 1981, p. 10.

tralized forces pushing for integration. In contrast to Western nations, CEMA countries do not benefit from the spur to integration given by wholesalers and retailers searching for low-cost sources of supply and producers looking for profitable markets for sales. Annual trade plans limit exports and imports, and the negotiated price system deprives producers and consumers of signals telling them who is the most efficient supplier and where the greatest demand lies.

Consequently, integration in CEMA is mainly a top-down process. But here again, CEMA faces organizational weaknesses. Despite the reliance on bureaucratic pressure within CEMA to increase economic integration, the organization is not a supranational body with the power to take decisions in pursuit of economic integration and enforce them. There is no CEMA Commission with the power to make and implement regulations, as there is in the EC.[4] On the contrary, decisions in CEMA are taken through a series of international meetings designed to bring party heads, government leaders, and other officials together to examine matters of mutual economic interest.[5] Thus, CEMA provides an umbrella under which national leaders seek to coordinate domestic investment and production programs using bilateral and multilateral intergovernmental agreements. It has little independent power to devise and enforce these agreements.

Policy Instruments in CEMA

Despite these organizational weaknesses, the members of CEMA attempt to use the organization to overcome the obstacles to economic integration posed by their system of foreign trade. A battery of policy instruments are employed to reduce the inefficiencies in the flow of goods, services, and factors of production in the region. These include five-year trade agreements, long-term joint investment projects, target programs, long-term agreements on the exchange of scientific research and technologies, and joint ventures, as well as specialization and cooperation agreements.

Five-year trade agreements define the terms under which trade is to be conducted. They sketch out the product groups that countries have agreed to trade or projects to be embarked on during the course of the next five years. Annual trade plans are supposed to be drawn up within the framework of these treaties.

Long-term joint investment projects became popular in the 1970s and are the most spectacular instrument for intra-CEMA cooperation.

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[4]Sobell, 1984, p. 5.

[5]van Brabant, 1980, p. 183.

They are designed to assure long-term supplies of important industrial materials. Major projects include the Ust-Iluminsk cellulose mill, the Friendship oil pipeline and the Orenburg gas pipeline, and the ore enrichment plant at the Kursk magnetic anomaly. In these projects the East European countries agree to supply investment goods (actual physical capital) and in some cases hard currency in exchange for a share of the project's output at negotiated prices for a specified number of years. They are partially financed through the International Investment Bank (IIB) of CEMA. A project itself belongs to the country in which it is located.

Target programs are an invention of the late 1970s. These programs identify priority industrial sectors or groups of products and provide a framework for joint development and trade within these sectors. Five target programs were set up in the late 1970s, for fuels, agricultural and food products, raw materials, machine tools, and consumer durables.[6] Joint investment projects and specialization agreements are often devised for the purpose of fulfilling the goals of these programs.

Plan coordination is another important policy instrument. In 1971 the Committee for Cooperation in Planning, one of three Council Committees, was created. It has attempted to coordinate plans among the member countries but does not have the authority to function as a supranational planning authority.[7] Most real coordination takes place in high-level meetings between heads of planning commissions and other government and party leaders which are held when five-year plans are being drawn up. However, actual investment and trade decisions are made in the planning authorities and ministries of the participating governments.

Long-term agreements on science and technology provide a framework for agreements between research institutions and for joint research. They appear to define priority tasks and outline a division of labor. Agreements signed under these umbrella agreements stipulate the roles of the participating research institutes, scientific exchanges, and how the proceeds from inventions are to be divided among the participating countries. These agreements have been especially popular since Mikhail Gorbachev has come to power in the Soviet Union and are the primary policy instrument used in the "Comprehensive Program for CEMA Countries' Scientific and Technical Progress Through the Year 2000" adopted in 1985. They currently appear to involve commitments of investments as well as scientific and technical personnel.

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[6]Pecsi, 1981, pp. 68–70.

[7]van Brabant, 1980, pp. 187–189.

Joint ventures are rare in CEMA. They are generally joint-stoc companies with well-defined rules for sharing output. One of the bes known is the Haldex Corporation, a joint venture set up between Hun gary and Poland, whereby a Hungarian process is used to extract coa from Polish mine tailings. In general, such ventures suffer because o problems in resolving differences in pricing and enterprise controls between the participating countries, and problems of repatriation of profits and valuation of capital contributions.

Some of these policy instruments are complementary; others are used for one specific purpose. For example, long-term joint investment projects demand substantial plan coordination, since the larger of these absorb a large share of total investment in the smaller CEMA countries. Five-year trade agreements also imply some plan coordination. On the other hand, joint ventures have been used to achieve specific, limited goals such as exploitation of a new technology. The smaller science and technology agreements also probably do not demand much plan coordination.

THE EVOLUTION OF SPECIALIZATION AGREEMENTS

If measured by verbiage, specialization agreements appear to be an important additional policy instrument within this set. They have a somewhat narrower focus than target programs, as they are devoted to inducing the participating countries to specialize. Their role has slowly evolved in CEMA over the past few decades as the CEMA countries have attempted to use them to overcome the obstacles to exploiting the potential gains from increasing intra-CEMA trade.

Agreements on specialization first appeared in CEMA in the early 1950s. The first mention we found was an agreement signed in 195 whereby Hungary agreed to ship alumina to Czechoslovakia for pro cessing. Czechoslovakia kept part of the smelted metal as paymen and returned the rest of the aluminum ingots to Hungary.[8]

In 1956, agreements were hammered out in ferrous metals and bea ings.[9] They were administered by the Standing Commission for Fe rous Metallurgy and the Machine Building Commission, respectivel The Standing Commission for Ferrous Metallurgy draws up ferro metal balances for the region with data submitted by the memb countries. At that time, the ball-bearing branch of the Machine Buil ing Commission promoted cooperation in ball-bearings productio

[8]A. Iukas, "Kooperatsiia v aliuminievoi promyshlennotsi vengerskoi narodnoi respu liki," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, No. 3, 1975, pp. 32–36.

[9]Sobell, 1984, pp. 86, 183; van Brabant, 1980, p. 222.

much of this work has since been transferred to the Organization for Cooperation in the Ball-Bearing Industry.[10] Both commissions have helped improve economic efficiency by encouraging countries to specialize in the production of particular types of steel products and bearings, thereby permitting longer production runs and the installation of more specialized equipment. Agreements in both areas continue to operate today. However, participating countries appear to insist that trade in these products be balanced, so no country has given up its production of these items or successfully specialized to the extent that it supplies most of the rest of the region with steel or ball-bearings products.

There are other scattered references to specialization commitments in the 1950s, but these often appear to have been announced by the specializing country and not formalized by agreements. For example, Bulgaria announced its intention to specialize in forklifts in 1956,[11] and Hungary made a commitment to produce buses in the 1950s. Although other members of CEMA had an implicit commitment not to develop competing lines, it is difficult to find evidence that they actually signed treaties to this effect.

No further progress in setting up specialization agreements was made until the early 1960s, when two bilateral agreements were signed on trade in alumina and aluminum between Hungary and Poland (1960) and Hungary and the USSR (1962),[12] and an agreement was reached between Czechoslovakia and Poland on specialization and cooperation in the production of tractors (1962).[13]

An important step toward making specialization agreements a major CEMA policy instrument occurred in the late 1960s. In May 1967, a document entitled "Effective Measures for Improving Work on Industrial Specialization and Cooperation, in Particular Arrangements for Preparing, Codifying and Effecting Specialization and Cooperation in Production" was endorsed by the Executive Committee of CEMA.[14] This document marked a commitment to encourage the use of specialization agreements. The opening of the Volga automobile plant the next year provided a reason for implementing this new initiative with an increase in the use of specialization agreements. In 1968, the Soviet

[10]S. Stepanenko, "CMEA Standardization and the Socialist Community's Foreign Trade," *Foreign Trade*, March 1976, pp. 12–14.

[11]*Sofia Ikonomicheski Zhivot*, March 26, 1986.

[12]Iukas, 1975.

[13]Ota Henys, "Czechoslovakia's Cooperation with the CMEA Member Countries in the Engineering Industry," *Czechoslovak Foreign Trade*, Vol. 17, No. 6, 1977, pp. 7–10.

[14]*Analytical Report on Industrial Cooperation Among ECE Countries*, Economic Commission for Europe, The United Nations, Geneva, 1973, p. 55.

Union signed a series of bilateral agreements with Hungary, Bulgaria, and Poland on specialization and cooperation in the motor vehicle industry.[15] These agreements were preceded by a few bilateral agreements in Eastern Europe on agricultural equipment, most notably an extension of the agreement on specialization and cooperation in the production of Zetor tractors between Poland and Czechoslovakia[16] and a new agreement in agricultural machinery for applying plant protection agents signed between the GDR and Hungary in 1967.[17]

The first multilateral specialization agreement was the Multilateral Governmental Agreement on the Development, Production and Application of Electronic Data Processing Equipment signed in 1969, in which all the European members of CEMA have participated. This agreement has been labeled a partial success by both CEMA and Western commentators.[18] Under its terms, CEMA members have developed a family of mutually compatible computer peripherals and computers based on the design of the IBM S/360. Each country specializes in a different market niche. For example, the USSR manufactures large computers, Hungary makes minicomputers and punch-card equipment, the GDR produces line printers, and Bulgaria has specialized in disk drives.[19]

A major campaign to sign specialization agreements began after the signing of the Complex Program in 1971. At this time, specialization agreements became a formal policy instrument within CEMA, and rules on their form and content were laid down.

The result was a surge in trade falling under specialization agreements. For most countries, intra-CEMA trade in machinery products falling under specialization agreements increased from less than 1 percent[20] in 1970 to about 20 percent in 1975 and reached even higher levels in the 1980s (Table 1). However, most of this trade was merely old

[15]Sobell, 1984, pp. 173–182; Edward Lukosh, "Automobile Building in Poland on the Paths to Cooperation," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, No. 6, 1984, pp. 9–12.

[16]Adam Budnikowski and Marek Kulczycki, "Wspolpraca produkcyjna krajow RWPG a system keirowania gospodarka," *Handel Zagraniczny*, No. 9, 1977.

[17]Miklos Breitner, "Production Specialization: Two Models," *Hungarian Foreign Trade*, No. 3, 1973, pp. 52–53.

[18]S. E. Goodman, "Computing and the Development of the Soviet Economy," in *Soviet Economy in a Time of Change*, Joint Economic Committee of Congress, U.S. Government Printing Office, Washington, D.C., 1979; L. Livintsev, "Socialist Economic Integration: The Principal Trends in Cooperation of CMEA Countries in the Field of Machine Building," *Planovoye Khozyaystvo*, No. 2, February 1983.

[19]Miklos Breitner, "In a New Language, In a Common Language," *Hungarian Foreign Trade*, No. 3, 1972, pp. 19–24.

[20]Janusz Hrynkiewicz, "30 lat wspolpracy—gospodarczej Polska-NRD," *Handel Zagraniczny*, GDR Issue, 1979, pp. 3–8.

wine in new bottles; previous trade flows were included under specialization agreements.

The percentage of *total* intra-CEMA trade falling under specialization agreements, especially East European exports to the Soviet Union, also grew rapidly. Products falling under specialization agreements accounted for 1 percent of total East German exports to CEMA countries in 1970, 17 percent in 1975, and 39 percent in 1985.[21] Shares in total GDR exports to the Soviet Union increased even more, from 1 percent in 1970 to 28 percent in 1975, to a peak of 51 percent in 1983, before declining to 49 percent in 1985. These increases do not reflect an increase in trade as much as the proliferation of specialization agreements after the signing of the Complex Program. The figures indicate that products falling under specialization agreements comprise a growing share of total trade in CEMA, but the rate of growth in this percentage has declined. In the case of the GDR, the percentage of products traded under specialization agreements actually fell in 1984.

A second wave of specialization agreements began in the late 1970s when the five large target programs mentioned above were drawn up.[22] Many specialization agreements have subsequently been signed under the umbrellas of these programs. For example, agreements on specialization and cooperation in the exchange of breeding cattle (milk and

Table 1

SHARES OF MACHINERY EXPORTS TO CEMA UNDER SPECIALIZATION AGREEMENTS

	Percent of Exports	
Country	1975	1981
Bulgaria	35.7	52.1
Czechoslovakia	14.6	34.4
GDR	25.9	41.0
Hungary	23.6	43.8
Poland	18.3	27.1
Romania	36.2	35.6
Soviet Union	16.7	20.5
Average	21.7	34.4

SOURCE: Maria Bogacka, "Kierunki poglebiania kooperacji produkcji miedzy krajami RWPG," *Handel Zagraniczny*, September 1984, pp. 11–13.

[21] *Statistisches Jahrbuch der Deutschen Demokratischen Republik*, 1981, 1986.

[22] Pecsi, 1981, pp. 68–70.

beef) were extended and broadened in April 1981 under the agricultural target program.[23] The CEMA-wide target programs provided the impetus for several bilateral specialization agreements that fleshed out broader intergovernmental agreements in a particular industry or targeted area. A multilateral agreement on metal-cutting machine tools which appears to fall under the target program for machine tools was signed in 1981.[24] Subsequently, the Soviet Union and Hungary expanded and extended bilateral agreements in machine tool building in 1984.[25]

In the mid-1980s, the signing of new specialization agreements began to slow down, as fewer products remained to be covered; by now, some products in almost all branches of the machine-building and chemical industries are included in specialization agreements. In view of the number and range of agreements in existence, we expect increases to be small in future years. Past agreements continue to be expanded upon, updated, and in some cases canceled; most products easily incorporated into specialization agreements have already been covered. In some sense, specialization agreements can be characterized as a mature policy instrument.

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[23]Dimitir Iurokov, "Realizatsiia DTsPS v oblasti sel'skogo khoziastva," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, December 1982, pp. 34–38.

[24]Martin Rainkhard, "Novye rubezhi mnogostoronnego ekonomichskogo sotrudnichestva stran-chlenov SEV v oblasti stankostroeniia," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, February 1982, pp. 33–37.

[25]Alexei Krokhotin, "Meeting of the Soviet-Hungarian Commission," *Foreign Trade*, May 1984, pp. 20–22.

III. CHARACTERISTICS OF SPECIALIZATION AGREEMENTS

GOALS

Specialization

Specialization has been the primary means for developing a permanent division of production among the CEMA countries. As defined in the CEMA document "The Principles of the Socialist International Division of Labor," the concept of production specialization and cooperation is as follows:

> Specialization among states means that the production of the same kinds of products to satisfy the needs of all the interested countries is concentrated in one or a few socialist countries. In this context the standards of production technology and organization are raised, and stable economic relations and production cooperation are established among the countries. The result of international specialization in production is that production volume increases, costs are reduced, labor productivity rises, product quality improves, and the technical features of the products are perfected.[1]

Pecsi, who cites this definition, breaks it down into finer detail. He states that international production specialization is the permanent division of the production and development of finished products, main components, or parts between individual countries for the purpose of satisfying needs more efficiently by increasing the scale of production and concentrating and shortening product development.[2] Pecsi's emphasis on economies of scale may, however, be misguided. East European and Western experience frequently indicates that the increasing costs of managing large operations frequently swamp the expected economies of scale.

Specialization Agreements and Specialization

The primary policy instrument employed in CEMA to encourage specialization in the production of manufactured goods, especially machinery and chemicals, is specialization agreements. These agreements are designed to encourage countries to develop a comparative advantage in the production of particular commodities by constructing

[1]Pecsi, 1981, p. 10.

[2]Pecsi, 1981, p. 11.

plants to exploit economies of scale and by the development of technical expertise through learning by doing and through research and development in the industry of specialization. Countries do not choose to specialize in a product because their factor endowments (capital, labor, mineral deposits, etc.) are such that they have a comparative advantage in that product. In fact, some countries, such as Romania and Bulgaria, which are relatively poorly endowed with physical and human capital, were granted the right to specialize in a product in order to assist their development.

THE CONTENT AND EXTENT OF SPECIALIZATION AGREEMENTS

Contents

Specialization agreements stipulate the types of products and direction of trade among the participants, but they do not set down detailed trade arrangements. These are incorporated in the annual trade agreements. Items included in specialization and cooperation agreements appear as separate items in the long-term and annual trade accords.[3] Somewhat surprisingly, agreements are not legally binding on the enterprise; to become legally binding, the provisions must be incorporated into the annual trade agreements.[4] In other words, although enterprises or foreign trade organizations have a legal obligation to fulfill contracts signed under foreign trade agreements, they have no such commitment under specialization agreements. Managers may face reprimands or bonus reductions for failing to meet export targets. Specialization agreements per se contain no such penalties.

Specialization agreements usually run for five years or five-year increments (10 years, 15 years, etc.), coinciding with five-year plan periods.[5] This permits the participating countries to implement investment decisions made on the basis of the specialization agreement and to recoup investment costs, but it also allows the importing country to cut off the agreement (or threaten to cut it off) after a reasonable period of time, if it finds the agreement unsatisfactory. For example, Poland canceled an agreement with Yugoslavia in appliances. The timing of many specialization agreements also permits planners to plan

[3]Dezso Soky, "The Results, Directions and Problems of Industrial Cooperation and Specialization," *Vilaggazdasag*, September 17, 1976, pp. 1–3.

[4]Yelena Lyakina-Frolova and Vladislav Kuvshinov, "Legal Aspects of Direct Ties," *Foreign Trade*, November 1985, pp. 9–13.

[5]Economic Commission for Europe, *Analytical Report on Industrial Cooperation Among ECE Countries*, United Nations, Geneva, 1973, p. 54.

the investments needed to implement these plans and incorporate them within the bilateral protocols on plan coordination usually signed at the beginning of every five-year plan period. These protocols specify in general terms quotas and types of products for delivery under specialization agreements.

In general, specialization agreements are separated into two classes: intergovernmental agreements that are signed by representatives of the central government, up to and including the premier, and intersectoral or interdepartmental agreements that are usually signed by branch ministers. Intergovernmental agreements cover specialization and cooperation measures that affect the design and manufacture of new types of products of great economic or technological interest. For example, the Long-Term Agreement on Multilateral Specialization and Cooperation in the Production and Mutual Deliveries of Equipment for Atomic Power Stations (June 28, 1979) and the General Agreement on Multilateral Cooperation in the Development and Organization of Specialized and Cooperative Production of Industrial Robots (1982) are intergovernmental agreements.[6] Both of these programs involve very large investments by the participating countries, and both led to the creation of new industries. Czechoslovakia has put a substantial share of investment in the machine-building industry into facilities for the construction of nuclear-power generating equipment over the past ten years under the terms of this specialization agreement,[7] and many of the participants in the robotics agreements are also coordinating their investment and development plans on the basis of that agreement.[8]

Intersectoral or interbranch agreements cover more mundane articles, such as tractors or pulp and paper.[9] They involve exchanges between the same industrial branch in two or more countries, and they have lower status in the CEMA institutional hierarchy because they are concluded by the branch and foreign trade ministers. For example, in 1986, the minister in charge of the coal industry in Poland, Czeslaw Piotrowski, and his counterpart in the Soviet Union, M. Shchadov, extended an intersectoral specialization agreement on coal-mining equipment.[10] In one unusual case, the director of a Bulgarian enterprise, the Madara works, signed an 83.5-million-ruble agreement with

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[6]Lyakina-Frolova and Kuvshinov, 1985.

[7]Zdenek Shedivy, "Uchastie ChSSR v realizatsii soglasovannogo plana mnogostoronnikh integratsionnykh meropriiatii stran-chlenov SEV na 1976–1980 gg.," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, 1981.

[8]Pavol Bahyl, "Robotization Becomes More Urgent," *Hospodarske Noviny*, August 5, 1983, pp. 1,6.

[9]Lyakina-Frolova and Kuvshinov, 1985.

[10]"Last Week at Home," *Zycie Gospodarcze*, No. 30, July 27, 1986.

Czechoslovakia's Liberec works, extending cooperation in the production of trucks at the 1981 Plovdiv Trade Fair.[11] Both of these enterprises are considered combinates and are among the largest in their home countries. Prior branch ministry approval was still necessary before signing the agreement, however.

Specialization agreements can be quite narrow—one between Czechoslovakia and the GDR covers only knitting needles.[12] They can also be very broad—the agreement on computers laid the basis for the development of an integrated family of computers within CEMA.[13]

In almost all cases, agreements specify that both countries will specialize in different products in the same industrial branch. Consequently, most agreements involve exchanges of similar products. For example, in the Zetor tractor agreement between Poland and Czechoslovakia, tractors are exchanged for tractor components or other types of tractors, not for raw materials or other types of machinery.[14]

Distribution by Country

The member countries of CEMA have agreed to collect statistics on specialization agreements since the signing of the Complex Program.[15] The CEMA Secretariat collects and aggregates these statistics, although open statistical reporting appears to be at the option of the member countries. For example, only the GDR and Bulgaria publish statistics on the percentage of their total trade falling under specialization agreements. Unfortunately, the CEMA Secretariat itself publishes little statistical data on specialization agreements in their statistical yearbooks. Most of the statistics that appear are published in journal articles by scholars from CEMA member states; they are not published in the CEMA statistical yearbook.

Nevertheless, it is possible to trace the increase in total numbers of agreements from these sources. From a few scattered agreements in the late 1960s, the total number of specialization agreements grew exponentially in the early 1970s and continued to climb through 1977

[11]*Reveu Obchodu*, January 1982, cited in Defense Intelligence Agency, *Warsaw Pact Economic Integration*, August 1983, p. 50.

[12]Nikolai Ezhov, "Sotrudnichestvo stran-chlenov SEV po obespecheniiu tekstil'noi promyshlennosti sovremennym vysokoproizvoditel'nym oborudivaniem," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, No. 2, 1982, pp. 45–48.

[13]M. Ye. Rakovskiy, "Computer Cooperation in the CMEA," *Soviet Export*, Vol. 22, No. 5, September-October 1979, pp. 11–15.

[14]Budnikowski and Kulczycki, 1977; Irena Cieniuch, Barbara Durka, and Jerzy Marciszewski, "Wspolpraca produkcyjna Polski z krajami RWPG," *Handel Zagraniczny*, No. 8, 1977.

[15]van Brabant, 1980.

(Table 2). They continued to increase from their level of 735 in 1977 to roughly 1,000 bilateral and 130 multilateral agreements in the early 1980s, whereupon the number leveled off.[16]

The pattern of agreements by country tells an interesting story. In 1977, the Soviet Union participated in 90 percent of all multilateral agreements, almost as many as any other country in CEMA, but the smaller, more industrial countries participated in many more bilateral agreements. The GDR participated in nearly three times as many bilateral agreements as the USSR; and Czechoslovakia, Hungary, and Poland all participated in more agreements than the Soviet Union. Although these ratios may have changed in recent years, our own tally continues to show Czechoslovakia participating in substantially more bilateral agreements than the Soviet Union (Table 3).

In the case of multilateral agreements such as those on computers, robotics, and nuclear power, the Soviet Union is the driving force. These programs often involve products that fall under COCOM restrictions and are of strategic importance. Other such agreements are in areas such as energy or food that had high priority in the Soviet Union at the time of signing. The small number of multilateral agreements in which the Soviets participated in 1975 and the small total of multilateral agreements in that year indicate that Soviet participation and push are necessary for large programs. Moreover, the Soviets reportedly discouraged multilateral agreements solely among East Europeans for political reasons.

On the other hand, the figures indicate that the Soviet Union is not the driving force behind most bilateral specialization agreements. These appear to function very well without the Soviets.

The smaller countries may use bilateral specialization agreements at the interbranch level to a much greater extent than does the Soviet Union, in order to eliminate inefficient production lines. In the 1950s, the GDR and Czechoslovakia were often assigned the production of items that had previously been imported from the West. Because these countries had a fairly skilled work force and possessed a more advanced capital stock, they were able to produce most goods. In the 1970s, with the advent of labor shortages and an increased emphasis on more efficient use of inputs, the Czechoslovakian and East German governments faced more pressure to eliminate less-efficient production lines, including some of the lines for the production they were assigned to produce during the 1950s. Although the Soviet Union has also been concerned about inefficient production, it has probably been able to

[16]V. Shastitko, "Integration of the Machine-Building Complex of the European Member Countries of the CMEA," Akademia Nauk, Moscow, 1985, p. 178.

Table 2

NUMBERS OF SPECIALIZATION AGREEMENTS IN CEMA, BY COUNTRY

Country	1975	1976	1977
	Bilateral Agreements Only		
Bulgaria	8	64	121
Czechoslovakia	156	180	180
The GDR	305	305	362
Hungary	114	161	162
Poland	156	160	220
Romania	39	63	106
USSR	76	105	123
Total	419	519	637
	Multilateral Agreements Only		
Bulgaria	19	53	87
Czechoslovakia	35	60	79
The GDR	23	23	98
Hungary	44	81	72
Poland	27	54	96
Romania	21	30	53
USSR	28	82	88
Total	57	89	98
	Grand Total		
Bulgaria	27	117	208
Czechoslovakia	191	240	259
The GDR	328	328	460
Hungary	158	242	234
Poland	183	214	316
Romania	60	93	159
USSR	104	187	211
Total	476	608	735

SOURCE: Jozef Kowalkewski, "Wspolpraca przemyslowa krajow RWPG," *Handel Zagraniczny*, November 1980, pp. 16–25.

concentrate on internal restructuring, because its domestic market is so much larger, enabling it to achieve economies of scale in almost all industries.

Specialization agreements have provided a partial solution to this problem. Many of the specialization agreements cover small product ranges of specialized machinery. For example, the GDR and Czechoslovakia specialize in different types of track-laying equipment for the national railroads. They also have extensive bilateral and trilateral agreements with Poland for the production of different types of construction equipment and agricultural machinery. These agreements are fairly restricted, covering a few product lines; the larger intergovernmental agreements, such as those in computers and robotics, cover whole industries. These intersectoral, bilateral agreements allow the participating countries to stop the production of small series of complicated equipment at which they are not particularly efficient. This may explain why the more industrial countries participate so avidly in specialization agreements.

Tables 2 and 3 corroborate Romania's declared policy of restricting involvement in CEMA. (Romania has had the lowest rate of participation in both total and multilateral agreements.)

Distribution by Industry

Table 3 shows a breakdown of a sample of specialization agreements by country and industry. It was derived by tallying the agreements listed in the RAND database of specialization agreements.

Our total of 888 identified bilateral agreements is less than the 1,000 bilateral agreements cited by Shastitko,[17] and our total of 331 multilateral agreements is substantially higher than his figure of 130, so our tally is probably somewhat biased. This bias is partly the result of our inability to obtain an East German trade magazine, which probably led to the omission of some agreements involving East Germany and lower totals for East German participation. We also were unable to obtain *Bulgarian Foreign Trade*, the commercial trade magazine published by the Bulgarian government, but the share of agreements in which Bulgaria participates compares well with the figures in Table 2, while the East German figures do not.

Because most of the available articles only referred to specialization agreements and did not specify their titles, some double counting probably occurred—some specialization agreements may have been incorporated into the directory under more than one name. This probably

[17]Shastitko, 1985, p. 178.

Table 3

DISTRIBUTION OF A SAMPLE OF SPECIALIZATION AGREEMENTS, BY COUNTRY

Product	Total Multi-lateral	Bilateral								
		Total	Bulgaria	Czecho-slovakia	GDR	Hungary	Poland	Romania	USSR	Yugo-slavia
Heavy Machinery Subtotals	19	85	10	34	18	15	32	9	33	11
Tractors and other agricultural equipment	9	49	7	20	10	10	14	5	15	4
Cranes	1	5	1	0	1	1	5	1	3	0
Excavators	0	3	0	3	1	0	0	0	0	2
Construction and road-building equipment	3	18	1	8	3	3	9	1	9	4
Mining equipment	6	10	1	3	3	1	4	2	6	1
Transportation Equipment Subtotals	25	108	26	38	24	29	38	10	47	7
Aircraft and aviation	3	7	1	2	0	0	3	1	7	0
Locomotives and railway cars	8	16	1	5	9	2	2	4	10	1
Streetcars	1	6	2	4	1	2	1	0	1	1
Motor vehicles	9	66	18	22	12	25	24	4	24	4
Ships and ship's equipment	4	13	4	5	2	0	8	1	5	1
Light Processing Equipment Subtotals	26	62	15	30	23	8	14	6	28	0
Textile equipment	15	25	4	17	9	2	6	1	11	0
Tobacco and tobacco processing equipment	2	4	3	3	1	0	0	0	1	0
Food processing equipment	4	26	8	8	7	6	6	5	12	0
Printing equipment	4	6	0	2	5	0	2	0	3	0
Paper equipment	1	1	0	0	1	0	0	0	1	0
Heavy Processing Equipment Subtotals	23	30	3	16	4	10	2	3	19	3
Chemical equipment	8	16	2	7	2	5	2	1	12	1
Pollution control and sanitary equipment	4	3	0	3	0	1	0	0	1	1
Oil refining, drilling, and pipeline equipment	8	10	0	6	1	4	0	2	6	1
Construction materials equipment	3	1	1	0	1	0	0	0	0	0

Table 3 (continued)

Product	Total Multi-lateral	Bilateral								
		Total	Bulgaria	Czecho-slovakia	GDR	Hungary	Poland	Romania	USSR	Yugo-slavia
Machine Tools Subtotals	30	80	18	36	28	12	21	17	27	6
Forges and presses	3	5	0	2	1	0	0	2	4	1
Other metallurgical equipment	5	12	2	7	7	1	1	2	4	0
Lathes	1	7	2	3	2	1	4	0	2	0
Grinders and abrasives	0	5	1	2	3	1	0	1	1	1
Handtools and tools	0	4	2	1	2	2	0	0	0	1
Machine tools	21	47	11	21	13	7	16	12	16	3
Other Machinery Subtotals	7	30	6	19	10	7	6	5	10	1
Pumps	3	14	0	11	5	3	2	0	6	1
Compressors	1	5	2	3	1	0	1	0	3	0
Hydraulic equipment and pneumatic equipment	3	8	4	5	3	4	2	4	0	0
Irrigation equipment	0	3	0	0	1	0	1	1	1	0
Automated Production Systems and Robots Subtotals	4	9	1	4	3	1	2	2	7	0
Automated production systems	1	2	0	0	1	0	1	1	1	0
Automatic control equipment	0	3	0	2	0	1	1	1	3	0
Robots	3	4	1	2	2	0	0	0	3	0
Electronics Subtotals	28	62	14	20	18	15	21	5	30	1
Microelectronics	9	8	1	6	3	2	0	0	4	0
Other electronics	6	27	5	11	7	7	13	3	7	1
Computers	5	15	5	2	6	2	4	2	9	0
Communications equipment	8	12	3	1	2	4	4	0	10	0
Instruments and Medical Equipment Subtotals	19	49	2	27	21	14	8	6	20	0
Medical equipment and instruments	6	15	0	10	5	4	4	1	6	0
Nuclear instruments	2	0	0	0	0	0	0	0	0	0
Measuring instruments	4	9	0	5	5	1	4	0	3	0
Optoelectronics and optical equipment	1	5	0	0	4	2	0	3	1	0
Other instruments	6	20	2	12	7	7	0	2	10	0

Table 3 (continued)

Product	Total Multi-lateral	Bilateral								
		Total	Bulgaria	Czecho-slovakia	GDR	Hungary	Poland	Romania	USSR	Yugo-slavia
Commercial Machinery Subtotals	8	24	7	10	8	6	5	4	7	1
Office equipment	0	4	0	2	2	2	2	0	0	0
Commercial equipment	1	7	0	4	1	1	2	3	2	1
Forklifts, lifting equipment and hoisting equipment	7	13	7	4	5	3	1	1	5	0
Electrical Equipment Subtotals	25	75	15	40	16	9	27	10	23	10
Lighting equipment	2	7	1	5	4	0	3	0	0	0
Cables	2	3	0	2	2	0	1	1	0	0
Transformers	2	3	2	0	1	0	0	1	2	0
Electric motors	2	9	2	5	1	1	3	1	5	0
Other electrical equipment	8	29	7	15	3	2	13	3	10	6
Atomic power plant equipment	5	6	1	5	1	0	0	1	3	1
Electric power equipment	4	18	2	8	4	6	7	3	3	3
Metals and Metal Products Subtotals	13	48	2	27	12	16	22	10	13	4
Bearings	3	5	1	2	0	2	1	3	1	0
Boilers	0	4	0	0	0	2	2	1	2	1
Armatures	0	5	0	3	2	2	3	0	0	0
Industrial fittings	0	5	0	4	2	1	2	0	1	0
Containers	2	1	0	0	0	0	1	0	1	0
Ferrous metals	3	17	1	14	7	4	9	4	3	2
Aluminum	0	4	0	1	0	4	1	0	2	0
Other nonferrous metals	1	7	0	3	1	1	3	2	3	1
Highly pure metals	4	0	0	0	0	0	0	0	0	0

Table 3 (continued)

Product	Total Multi-lateral	Bilateral								
		Total	Bulgaria	Czecho-slovakia	GDR	Hungary	Poland	Romania	USSR	Yugo-slavia
Consumer Goods Subtotals	23	78	11	52	28	15	21	3	18	10
Televisions	4	6	2	4	2	2	2	0	1	2
Refrigerators	1	4	0	3	0	1	1	0	2	1
Other appliances	2	15	1	12	7	0	4	0	0	6
Furniture and woodworking equipment	3	3	0	3	1	1	0	0	1	0
Leather	4	2	0	1	0	1	1	0	1	0
Textiles	2	13	3	5	2	5	7	2	2	0
Paper	3	9	2	2	2	2	1	1	8	0
Miscellaneous consumer goods	4	26	3	22	14	3	5	0	3	1
Agricultural Products Subtotals	16	3	0	2	0	0	1	0	2	0
Food	8	0	0	0	0	0	0	0	0	0
Seeds	3	2	0	1	0	0	1	0	1	0
Livestock	5	1	0	1	0	0	0	0	1	0
Construction Materials Subtotals	15	7	2	7	2	1	1	0	1	0
Glass and ceramics	10	3	1	3	1	0	1	0	0	0
Construction materials	5	4	1	4	1	1	0	0	1	0

Table 3 (continued)

Product	Total Multi-lateral	Bilateral								
		Total	Bulgaria	Czecho-slovakia	GDR	Hungary	Poland	Romania	USSR	Yugo-slavia
Chemicals Subtotals	50	138	18	68	28	36	46	34	45	2
Agrochemicals	5	11	1	5	2	4	2	4	4	0
Fertilizer	2	3	0	0	0	1	0	2	2	1
Olefins	0	4	0	2	2	1	1	0	2	1
Other petrochemicals	0	8	0	4	2	1	3	1	5	0
Drugs	2	17	5	6	3	5	6	5	4	0
Isotopes	1	1	0	1	0	0	1	0	0	0
Dyes	2	9	2	5	1	1	6	2	1	0
Paints and painting equipment	1	5	0	3	1	2	1	0	3	0
Surfactants	1	0	0	0	0	0	0	0	0	0
Household chemicals	2	1	0	0	0	1	0	1	0	0
Photochemicals	1	3	0	1	2	1	0	0	2	0
Highly pure chemicals	1	6	1	6	1	1	1	1	1	0
Rubber	7	24	3	12	2	7	11	9	4	0
Sulphur	0	3	0	3	0	0	3	0	0	0
Plastics	3	3	0	0	3	1	1	0	1	0
Other chemicals	22	40	6	20	9	10	10	9	16	0
TOTALS	331	888	150	430	243	194	267	124	330	56

SOURCE: Tallied from a RAND directory of CEMA specialization agreements culled from the CEMA commercial literature.

accounts for the large difference between our tally of multilateral specialization agreements and that of Shastitko.

Table 3 may also slight some industrial sectors that are considered sensitive by the CEMA countries and are therefore not discussed in the commercial trade literature. In particular, no mention was made in the literature of specialization agreements for the production of military equipment or goods. Whether such agreements exist is an open question. Nonetheless, it appears that we have identified most of the ongoing specialization agreements.

As shown in Table 3, specialization agreements have been signed in many industries, but the bulk of them lie in machinery and chemicals. Although the numbers of agreements do not reflect the value of the ensuing trade flows, it is clear that instruments, electrical equipment, electronics, and machine tools have been important areas for bilateral agreements. Countries can also pick a few product groups in pharmaceuticals and specialize in their production within the bloc. It appears that the ministries involved can easily perceive potential economies of scale in specializing in a particular product in these sectors. These industrial branches are characterized by products that must be manufactured to fit many specifications and often have very short production runs, so economies of scale are probably large.

As noted in the CEMA literature, raw materials are generally not traded within specialization agreements.[18] With the exception of the Hungarian aluminum agreements and the Polish agreements on sulfur, most of which originated in the 1960s, we found no bulk raw materials agreements. A few agreements were concluded in rare metals, such as vanadium,[19] but we found none in ores or energy carriers.

Consumer goods also get comparatively short shrift. Czechoslovakia and the GDR have been the most active in this area, with much of their trade confined to each other, under 52 and 28 bilateral agreements, respectively. We found only 18 for the USSR. Yugoslavia has been more active in consumer goods than in other areas. Most of the agreements cover appliances and consumer electronics. Foodstuffs are rarely included under specialization agreements, although a multilateral agreement on wine has been in effect since 1975.[20]

The dominance of the machinery sector in specialization agreements is also reflected in the value of trade under agreements. In 1985, 90

[18]Soky, 1976.

[19]Frantisek Dvorak, "The Czechoslovakian Chemical Industry and CEMA," *Czechoslovak Foreign Trade*, April 1982, pp. 16–19.

[20]Sandor Kovacs, "Rol' spetsializatsii i kooperirovanii proivodstva v razvitii pishchevoi promyshlennosti VNR," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, June 1978, pp. 29–34.

percent of Czech exports falling under specialization agreements consisted of machinery.[21]

Table 4 presents data on Hungarian trade under specialization agreements in 1976. Although more than a decade has passed since these figures were collected, our list of Hungarian specialization and cooperation agreements suggests that these figures are still representative. The percentage of trade in manufactures covered by specialization agreements fluctuates sharply from product to product within each sector. For example, in the chemical industry in 1976, 74.3 percent of Hungarian exports of pharmaceuticals and 68.3 percent of rubber products fell under specialization agreements, but only 19.4 percent of bulk chemicals fell under such agreements.[22] In other words, the degree to which specialization agreements were used varied sharply among product groups within the same sector.

The data also indicate areas of specialization by country. Poland's development of an export-oriented construction equipment industry through Bumar and Stalowa Wola is reflected in the large number of specialization agreements in which it is involved. Hungary has a large number of agreements in the motor vehicle industry; many of these represent agreements in components as well as buses. Czechoslovakia participated in over half the bilateral agreements in textile equipment, reflecting its dominant role in that industry. Bulgarian dominance in lifting equipment is demonstrated in its participation in seven of

Table 4

HUNGARIAN TRADE UNDER SPECIALIZATION AGREEMENTS, BY INDUSTRY IN 1976

Industry	Exports	Imports
Machinery and mechanical equipment	74.5	74.2
Metallurgical products and minerals	4.2	3.2
Pharmaceuticals, chemicals, and rubber	13.4	12.3
Building materials	0.3	2.2
Other materials	2.2	4.9
Seeds, planting stock	3.0	0.1
Consumer goods	2.4	3.1
Total	100.0	100.0

SOURCE: Soky, 1976.

[21]Stanislaw Novak, "From Potential to Actual Effects," *Hospodarske Noviny*, No. 25, 1986, p. 3, in JPRS-EER-86-125, August 15, 1986, p. 7.

[22]Soky, 1976.

thirteen bilateral specialization agreements in the industry. In contrast, the homogeneous distribution of specialization agreements in the pharmaceutical industry is somewhat surprising in light of Hungarian specialization in this sector.

Bilateral Balancing

The emphasis on bilateralism in the commercial literature concerning specialization agreements is striking. Most of the detailed discussions of agreements refer to "mutual exchanges," e.g., trading ball bearings for bearings or one type of machine for another. According to both Hungarian and Czech authors, bargaining among East European trade negotiators leads to de facto bilateral balancing in specialization agreements.[23] The need to balance trade flows within the product group covered by agreements is an important determinant of quantities traded. The literature thus indicates that balanced trade is an intrinsic feature of most specialization agreements.

There is an important exception to this rule: The proportion of Soviet exports to Eastern Europe falling under specialization agreements is smaller than the proportion of East European exports to the Soviet Union falling under such agreements. For example, in 1980, products falling under agreements made up 22 percent of total Polish exports to the Soviet Union, but only 10 percent of total Polish imports.[24] In 1983, 40 percent of Hungarian exports to the Soviet Union consisted of these products, compared with only 10 percent of imports.[25] As noted in Sec. II, similar ratios exist in East German-Soviet trade. Although the Soviets also export products under specialization agreements to Eastern Europe, these flows are much smaller than those from Eastern Europe to the Soviet Union. The ensuing deficits in machinery trade are made up by Soviet exports of raw materials. These figures reflect the general composition of trade flows in the bloc, which do not fall under specialization agreements, while East European manufactures do.

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[23]Janos Gacs, "A KGST kereteken folyo agazaton beluli szakositas es kooperacio problemai es nehany magyar tapasztalat," Mimeo., 1985, p. 12; and Novak, 1986.

[24]Wieslaw Szymak, "Stability—The Basis of Polish-Soviet Cooperation," *Foreign Trade*, December 1984, pp. 41–43.

[25]Krokhotkin, 1984, pp. 20–22.

IV. HOW DO SPECIALIZATION AGREEMENTS FUNCTION?

PREPARATION

Like all documents produced by bureaucracies, specialization agreements are the result of the ideas and initiative of coalitions with various motivations and varying amounts of power. Although we have not had access to case studies of the origins and implementation of specific agreements, the open CEMA commercial literature gives several insights into their birth. Unfortunately, the secrecy surrounding CEMA proceedings and the agreements themselves hindered our analysis and makes the allocation of institutional roles tentative.

All specialization agreements, intergovernmental and intersectoral, bilateral and multilateral, are supposed to be concluded on the basis of the Joint Terms of Specialization and Cooperation of Production Between the Organizations of the Member Countries of CEMA,[1] which stipulates the form and coverage of the agreement.

The organs of CEMA play an important role in the elaboration of specialization agreements.[2] Of these organs, the Standing Commissions of CEMA, organized by industry, play the most important technical role. They work out concrete recommendations concerning specialization in particular industrial sectors and the necessary additional investments.[3] For example, the CEMA Standing Commission on Engineering drew up a multilateral agreement on specialization in 1975 concerning specialization and cooperation in the manufacture of machine tools and accessories through 1980.[4] As noted in Section III, these commissions were also instrumental in drawing up agreements in ferrous metals and ball bearings. However, these recommendations are only implemented if the national authorities approve.

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[1]*Osnovnie Dokumenty Soveta Ekonomicheskoy Vzaimopomoshchi*, Moscow, 1981, Vol. 2, pp. 146–167.

[2]U. S. Shiryaev, *Mezhdunarodnaya Spetsializatsiya i Kooperirovaniya Proizvodstva Stran SEV. Sotsializm: Opyt. Problemy. Perspektivy*, Izdatel'stvo "Ekonomika," 1981, p. 236.

[3]United Nations, *Economic Integration and Industrial Specialization Among the Member Countries of the CMEA*, Department of Economic and Social Affairs, New York, 1966, p. 9.

[4]Mihaly Tamas, "With Renowned Machine Tool Factories Only," *Hungarian Foreign Trade*, No. 3, 1976, p. 25.

Standing commissions are composed of technical representatives from each of the CEMA countries.[5] They are generally senior managers or bureaucrats who are sometimes assigned to a commission before retirement and who have commercial or technical knowledge of a particular industry. These individuals have the technical qualifications to estimate the demand for various products, the available capacities, and the relative technical strengths of each participating country.[6] They are uniquely situated to discuss possible specialization agreements. For example, the Czechoslovak Deputy Minister of Foreign Trade in charge of machinery trade sat on the CEMA Engineering Committee.[7]

Some of the commissions have helped create international economic associations, such as Intermetal, which have legal status as discrete enterprises or organizations. These associations attempt to coordinate production of some items across CEMA. Some of them possess fixed assets and engage in service activities. However, they often act more as coordinators than enterprises with decisionmaking power; they rarely actually manufacture products. They facilitate the implementation of specialization agreements by providing service support, and they sometimes draw up specialization agreements. For example, the Interelektro international economic association had prepared 11 specialization agreements by 1980, and Agromash had prepared one.[8]

Each member country of CEMA participates in one bilateral Intergovernmental Commission on Economic, Technical and Scientific Cooperation with every other member, for a total of 21 such commissions. These groups usually meet once or twice a year and are reported upon in the commercial press. Protocols, which frequently contain new initiatives on specialization and cooperation, are published at the conclusion of the meetings.[9] The protocols indicate that the participants in these commissions are of high rank but have enough technical expertise to put together specialization agreements and ensure that they will be implemented.

The commissions consist of two parts, corresponding to the two nations, each part headed by a chairman. They are made up of various

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[5]United Nations, 1966, p. 9.

[6]Ibid., p. 9.

[7]"Interview with Emil Misovsky, RSDr., Deputy Minister of Foreign Trade," *Czechoslovak Foreign Trade*, Vol. 12, No. 1, 1972, pp. 17–19.

[8]Vaclav Pinkava, "Cooperation of the CMEA Member Countries in Engineering," *Czechoslovak Foreign Trade*, Vol. 20, No. 5, pp. 7–8.

[9]For example, Laddislav Laurinec, "Program of Specialization and Cooperation Between Czechoslovakia and the Soviet Union up to 1990," *Czechoslovak Foreign Trade*, January 1981, pp. 11–12.

representatives from the central authorities and the ministries of each country. Their auxiliary organs consist of subcommissions, task forces, and other organizations. Sometimes enterprises or associations are also represented in working groups. The commissions have a wide range of competence in the realm of production cooperation, trade, and scientific and technical cooperation.[10]

These commissions are the most important forums for drawing up and signing specialization agreements. For example, in 1979, the Intergovernmental Commission between the GDR and the USSR designated 33 major projects for production specialization and cooperation at its 25th, 26th, and 27th sessions. On the basis of these decisions, 202 government agreements and ministerial arrangements were completed over the next five years.[11] In short, this commission developed almost all the specialization agreements between the USSR and the GDR for the ensuing five-year period.

The evolution of the Multilateral Governmental Agreement on the Development, Production and Application of Electronic Data Processing Equipment illustrates the roles of these various organizations. Before the signing of the agreement in 1969, CEMA countries produced more than 30 different types of mutually incompatible computers. In the first five-year plan after signing the agreement, CEMA countries coordinated their investment and production decisions through CEMA councils, eliminating many of these incompatible systems and developing a whole range of compatible machines and software.[12] Subsequently, a unified technical R&D program was worked out in the Intergovernmental Computer Technology Commission.[13] The CEMA council contributed to the development of this specialization agreement with a resolution on the formulation of a program for the development of microprocessor technology signed in 1981. The CEMA council later approved an additional agreement, the General Agreement on Multilateral Cooperation and Introduction of Automated Design Systems," adopted in December 1985.

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[10]Krasimir Koev, "Organizational-Economic Forms of Socialist Integration: Nature, Development, Systematization," *Mezhdunarodni Otnosheniya*, Sofia, No. 6, 1980, pp. 76–88.

[11]Christian Meier, "Economic Relations Between the GDR and the USSR at the End of the 1981/1985 Five-Year Plan Period," Bundesinstitut fuer Ostwissenschaftliche und Internationale Studien, No. 6, 1986, pp. 1–65.

[12]"Exhibition of Yes ENM and Adder ENM Computers," *Pribory i Sistemy Upravleniya*, 11, 1979, pp. 9–13.

[13]Yuri Shcherbira, "Electronorgtechnica on the World Market," *Foreign Trade*, February 1981, pp. 15–18.

Intergovernmental Agreements

The way in which agreements are conceived depends a great deal on the level of interest in the project. Intergovernmental agreements are often formulated in accordance with industrial policy decisions within the Soviet Union. For example, the agreement on equipment for atomic power stations was signed during the acceleration of the Soviet atomic power program in the 1970s, agreements in seeds and breeding stock followed the Soviet decision to invest heavily in agriculture in the late 1970s, and the 1969 agreement on data processing equipment followed a Soviet decision to accelerate the development of its computer industry.

Because of their importance, multilateral agreements in CEMA tend to be intergovernmental. They are mainly developed through the acceptance of recommendations made by the standing commissions. The content of the agreements is prepared and agreed on in the course of evaluating and negotiating those recommendations.[14]

After a multilateral agreement is signed, participating countries usually sign a series of bilateral agreements. For example, the 1975 multilateral agreement on machine tools was followed by bilateral agreements on machine tools between Czechoslovakia and Romania, the GDR and Poland, Hungary and Poland, and Czechoslovakia and the Soviet Union. Gacs argues that these bilateral agreements are the de facto policy instruments. Trade flows under multilateral agreements are determined in the bilateral agreements and are generally bilaterally balanced, making it impossible for one or two countries to become the sole suppliers in an industry.[15]

Intersectoral Agreements

Intersectoral or interbranch agreements on production specialization and cooperation tend to be bilateral and are drafted by the branch and foreign trade ministries of the participating states. As noted above, these agreements are often developed within the framework of multilateral agreements at the level of the sectoral ministry.[16] They are usually signed by branch ministers and appear to be products of the initiatives of Intergovernmental Commissions on Economic, Technical and Scientific Cooperation. The contacts between the ministries occur through these intergovernmental commissions (or committees), and bilateral agreements are concluded according to their decisions.[17]

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[14]Shiryaev, 1981.

[15]Gacs, 1985, p. 12.

[16]Lyakina-Frolova and Kuvshinov, 1985.

[17]Chenchikovsky, 1975; Shiryaev, 1981.

Branch ministries, associations, and even large enterprises also play an important role in creating intersectoral specialization agreements. Frequent reference is made in the commercial literature to specialization agreements involving specific large enterprises or trusts.[18] These references indicate that particular factories in large enterprises become involved in specialization agreements. These factories may be singled out for expansion on the basis of the agreements and often benefit from the subsequent flow of orders. For example, Poland developed its construction equipment industry partly on the basis of orders stemming from specialization agreements.[19]

IMPLEMENTATION

Central Institutions

Specialization agreements establish deliveries for the long term. However, the agreements are general in nature; they detail neither the technologies involved in production nor the quantities traded. They also are not amended when market demands change.[20] Consequently, the degree to which the agreements are actually implemented depends on other policy instruments and the efforts of the institutions involved.

Despite increased emphasis on plan coordination in CEMA through coordination of investment and trade,[21] the major investment decisions that determine whether production capacities will exist and decisions on trade flows are made by the Politburos or Councils of Ministers of the participating countries and then implemented by planning commissions and the branch and functional ministries. Consequently, the success or failure of a specialization agreement will frequently depend on the importance ascribed to it by the top leadership. This in turn is likely to depend on the priority the partner governments ascribe to it, especially if one of the partners is the Soviet Union.

Investment decisions are incorporated in the five-year and annual investment plans of the member countries, and trade decisions are incorporated in the annual trade plans. Although trade ministers are involved in drafting specialization agreements and are aware of com-

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[18]For example, Adolf Hynek, "Transport and Building Machines of the IVTAS-Chrudim Corporation," *Czechoslovak Foreign Trade*, September 1972, pp. 21–22.

[19]"Wybrane problemy kooperacji przemyslowej," *Handel Zagraniczny*, November 1977, pp. 28–34.

[20]T. Bauer and K. A. Soos, "Inter-Firm Relations and Technological Change in Eastern Europe—The Case of the Hungarian Motor Industry," *Acta Oeconomica*, Vol. 23, 1979, p. 292.

[21]van Brabant, 1980, pp. 187–189.

mitments made under these agreements, contractual commitments appear to be made only within the framework of the annual trade plans. Products sold under specialization agreements are listed in a separate, special section of the trade plans, but during periods of balance-of-payments or production problems, specialization agreements may be ignored. For example, it appears that Romania abrogated its specialization agreement with Poland in locomotives during the early 1980s when Romania suffered economic setbacks. The degree of central pressure appears to determine whether an agreement is honored. Moreover, trade ministers have no authority over investment decisions. Investments needed to fulfill specialization agreements must compete with other claimants for the pool of investment funds allocated by the planning commissions.

Industrial Enterprises

Given the centralized structure of enterprise management in Eastern Europe, most of the decisions on specialization agreements are probably made at the ministerial level, but the active participation of the enterprise or trust manager appears to be important if the agreements are to be successfully implemented. In fact, one source argues that most agreements are between economic organizations, rather than ministries or governments.[22] The discussion of involvement in specialization agreements by industrial trusts and large enterprises in the commercial literature indicates that the agreements can become an important part of sales and production plans.

At the 35th Meeting of the CEMA Council Session, in 1981, the state delegations advocated the extensive development of direct ties among the ministries, economic organizations, and enterprises.[23] This decision followed closely on the heels of a decree by the USSR Council of Ministers entitled "On the Further Improvement of the Cooperation of USSR Ministries and Departments, Associations, Enterprises and Organizations with the Corresponding Organs, Enterprises and Organizations of the Other CEMA Member Countries in the Area of Science, Technology and the International Specialization and Cooperation of Production" and the Comprehensive Program for CEMA Countries'

[22]Vlasta Safarikova, "Active Participation of the Czechoslovak Economy in the Development of Industrial Specialization and Cooperation Within the CMEA Community," *Czechoslovak Foreign Trade*, Vol. 20, No. 6, 1980, pp. 6–8.

[23]Vladimir Grinev, "Cooperation and Direct Ties," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, No. 9, 1985, pp. 28–31; V. Morozov, "Direct Ties—An Effective Form of Cooperation," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV*, No. 1, 1983, pp. 59–61.

Scientific and Technical Progress Through the Year 2000, adopted in 1985. The decree gave the branch ministries and, with their approval, subordinate organizations the right to implement direct ties with organs, economic organizations, and enterprises for the purposes of broadening cooperation. The ministries can make decisions independently on the conclusion of short-term economic contracts. However, enterprises are permitted to correspond with other national enterprises only on scientific and technical questions not connected with commercial conditions of operation.[24] For instance, the IFA truck combine of the GDR participates in joint working groups with other CEMA countries for the purpose of coordinating production under specialization and cooperation.[25]

Direct international contacts between cooperating enterprises have thus far been limited to either the exchange of research information or the formation of international economic organizations. There are no direct contacts between individual enterprises concerning production that bypass the ministry, although new legislation in the Soviet Union, Poland, and Hungary has created possibilities in this area.[26]

Other Institutions

Several other economic organizations have facilitated the implementation of specialization agreements since the early 1970s. These include temporary or permanent task forces or joint commissions, international economic associations, and the CEMA banks.

As noted above, intergovernmental commissions and the standing commissions of CEMA have been instrumental in drawing up specialization agreements. They also play an important role in the implementation of those agreements. In particular, they provide a forum in which problems can be worked out and complaints voiced. For example, Polish and Yugoslav ministers and enterprise managers had engaged in several acerbic exchanges over a specialization agreement concerning automatic washing machines during a meeting of a Polish-Yugoslav roundtable on trade.[27] Subsequently, this agreement was

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[24]O. Bakovetskiy and V. Grinev, "On Direct Production Ties," *Voprosy Ekonomiki*, No. 4, 1982, pp. 113–121.

[25]Lotar Heinzmann, "Active Partnership," *Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV,* No. 8, 1984, pp. 57–61.

[26]Ivan Schwietzer, "Order of Magnitude and Market Behavior of the Hungarian Machine Industry Enterprises," *Kulgazdasag*, No. 2, 1984, pp. 21–34.

[27]"Wybrane problemy kooperacji przemyslowej," *Handel Zagraniczny*, November 1977, pp. 28–34.

allowed to lapse, but other Yugoslav-Polish agreements were improved due to these discussions.

Another example of the workings of such a commission was the 1981 meeting of the Hungarian-Bulgarian Joint Committee for Economic, Technical and Scientific Cooperation in Budapest. That meeting assessed the success of cooperation and international trade in the motor vehicle industry in 1981 and determined trade and cooperation agreements for 1982. It decided to promote cooperation in mechanical engineering, including the manufacture of diesel engines and road vehicles.[28]

International economic associations often provide support services in conjunction with specialization agreements. For example, Intermetal, located in Budapest, helps coordinate steel production falling under specialization agreements.

The International Investment Bank (IIB) also facilitates the implementation of specialization agreements by providing investment credits for projects that will expand the production of items falling under agreements. For example, IIB provided funds to the Scharfenstein works in the GDR for the purchase of equipment for the production of refrigerators.[29]

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[28]Survey of World Broadcasts (EEU), February 25, 1982, cited in Defense Intelligence Agency, *Warsaw Pact Economic Integration*, November 1982.

[29]Albert Balichenko, "International Investment Bank and CMEA Member-Country Cooperation," *Foreign Trade*, September 1983, pp. 41–46.

V. ECONOMIC INTEGRATION AND SPECIALIZATION AGREEMENTS

As noted in Sec. II, specialization agreements are the primary policy instrument employed in CEMA to pursue specialization in manufacturing. This section assesses the effectiveness of these agreements in achieving this goal and the broader goal of increasing CEMA integration.

ECONOMIC INTEGRATION

Economic integration is a fairly new term in economic parlance, having first appeared in the 1940s.[1] In many economic organizations, including the EC and CEMA, it is a normative concept: a state to be pursued or a process in which countries ought to participate. This objective appears to indicate a recognition that freer flows of factors of production and goods and services improve allocative efficiency and thereby increase aggregate welfare.

Economic Integration in Market Economies

In Western economies, one prerequisite for economic integration is that goods, services, and factors of production are permitted to flow freely between countries. The absence of formal barriers to trade is not the only prerequisite for integration; some countries have faced few artificial barriers to trade in the past, yet have not been economically integrated because of high transportation costs.

In market economies, the stimulus motivating the movement of factors of production and goods is the pursuit of individual welfare. Each individual attempts to obtain the greatest profit from his activities and then purchases the most advantageous bundle of goods available with his wealth and income. If wages are higher in another country, the individual may pack his bags and go to that country. If he can receive a higher rate of return by investing in a foreign land, he may do so. If he can purchase a commodity at a lower price or sell his goods at a higher price, he trades.

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[1]F. Machlup, *A History of Thought on Economic Integration,* Columbia University Press, New York, New York, 1977.

However, for these conditions to exist, there must be underlying differences between countries. One explanation, an offshoot of Ricardo's work, posits that technologies differ. If countries specialize in the production and export of goods manufactured with technologies in which they are relatively more efficient and import goods manufactured with technologies in which they are relatively inefficient, trade rises and global welfare is increased. Another explanation, the Heckscher-Ohlin theorem, posits that countries specialize in exporting products that utilize relatively intensively the factors of production found most abundantly in the country. Exploitation of economies of scale provides a third rationale for international trade. Without international markets, many countries would be unable to use technologies incorporating economies of scale, because their domestic markets are too small to absorb the resulting optimal production volume. Trade enables output not absorbed domestically to be exported.

Economic Integration in CEMA

The above are neo-classical rationales for trade. What relevance do they have for economic integration between centrally planned systems?

Increasing political and economic integration among the countries of CEMA has been a goal of the organization since its birth. It is also one of the purposes toward which specialization agreements have been directed. A precise definition of political and economic integration within CEMA is difficult to find, however. Abstracting from statements provided by the organization, participating governments envision economic integration as a product of technological change and the exploitation of economies of scale. Economic development, driven by technological change, is a process of continuous differentiation of the "tools of production," i.e., the capital stock. Differentiation leads to increasing specialization. Specialized producers become linked by trade, and as a result the "social division of labor" becomes international.[2]

This definition focuses on exploiting Ricardian gains from trade and economies of scale. Some bloc countries are assumed to possess or create technologies that are relatively, and in some cases absolutely, more efficient than those in other bloc countries. If countries specialize in their areas of comparative advantage, overall economic well-being will expand. CEMA countries are also assumed to be enabled by trade to construct plants of optimal production size. Thus, the emphasis in the bloc has been on specialization as a means to attain economies of

[2]United Nations, 1966, p. 1.

scale, focus research and development efforts, and better utilize capacities, thereby engendering comparative advantage.

CEMA is more reticent concerning trade based on Heckscher-Ohlin factors, i.e., specialization in products that are relatively more intensive in a country's abundant factor of production. This reticence may stem from the aftermath of the controversy between the Soviet Union and Romania in the early 1960s. The Soviets (and the Czechs) wanted the less-developed countries to specialize in the production of raw materials and agricultural products—items in which these countries purportedly enjoyed a comparative advantage. The more-developed countries were to specialize in manufactures.[3] Romania responded by reorienting its trade toward the Third World and the West, while the Soviets provided Bulgaria with a great deal of development aid. The trade patterns in CEMA determined by factor endowments now appear to be mainly those between the Soviet Union and Eastern Europe (energy for capital-intensive goods, such as machinery), not those within Eastern Europe itself.

An Operational Definition of Economic Integration

Jaroslav Nykryn, a Czech economist, argues that specialization and cooperation agreements lead to a more "complex" level of economic integration than simple trade. He maintains that straight trade involves the exchange of utility value only, while cooperation involves the exchange of both material and nonmaterial values, because know-how and managerial techniques are transferred, as well the physical product.[4]

Sobell, echoing Nykryn, argues that specialization and cooperation within CEMA must be analyzed using a different approach than the traditional, quantitative Western approach, which focuses on trade flows. He argues that these activities "are concerned with the development of internationalized production systems."[5] The agreements are "complex," involving many activities conducted over several years. We read Sobell as claiming that these agreements lead to economic integration because enterprises in two different countries participate in a

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[3]John Michael Montias, *Economic Development in Communist Romania*, M.I.T. Press, Cambridge, Mass., 1967.

[4]Jaroslav Nykryn, "Industrial Cooperation and International Trade," *Czechoslovak Foreign Trade*, Vol. 12, No. 1, 1972, p. 9.

[5]Sobell, 1984, p. 12.

common activity, not because they exchange goods and services with one another.

Nykryn and Sobell seem to be making a forced distinction between economic integration through the exchange of goods and services and economic integration through "cooperation and specialization." This distinction does not seem operational. Sales of almost any product usually involve multiple interactions with the customer. Producers of components for automobile manufacturers receive technical advice or sometimes even credits from their clients, yet their sales are considered commercial transactions. On the other hand, intra-enterprise transactions may involve fewer transactions than sales between two firms. Intra-enterprise exchanges within multinational corporations constitute a large share of foreign trade and are often conducted as if the two factories were members of different companies, even though no direct sales outside the corporation are involved.

A way to make an operational definition of economic integration is provided by Williamson, who stresses transactions and transaction costs. Williamson notes that transactions in market economies take place both through markets and within organizations, ranging from sales between different subsidiaries of the same corporation, to long-term contracts and joint ventures, to straight sales of commodities.[6] The form in which transactions take place, markets or hierarchies, depends on the respective costs of these forms.

The level of economic integration between two countries can be defined as the percentage of a country's *total transactions* of goods and services that involve another country. By focusing on total transactions rather than just foreign transactions, we can better capture the essence of economic integration: the relative importance of the foreign country in the economy of the home country. Transactions can involve the transfer of know-how and financial services, as well as the more traditional exchange of goods. Theoretically, precise measures of integration could be constructed by counting all the transactions in a region or summing their value. Changes in the percentage of these transactions conducted with another country over time would indicate changes in the level of integration. The level can be measured in terms of the value of total transactions or their total number and for transactions within particular sectors or for particular products. The higher the percentage, the greater the level of economic integration.

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[6]Oliver Williamson, *Markets and Hierarchies: Analysis and Anti-Trust Implications*, Free Press, New York, 1975.

HAVE SPECIALIZATION AGREEMENTS INCREASED ECONOMIC INTEGRATION?

Methodology

If specialization agreements have led to an increase in economic integration, their introduction should have been followed by a reallocation of goods and services. If this has not been the case, we would conclude that the agreements have not been successful despite the amount of verbiage on them.

Policy changes in other economic groupings have led to easily detectable changes in resource allocation. For example, the simultaneous entry of Spain and Portugal into the EC has increased economic integration between these two countries. Exports by Spain to Portugal and Portugal to Spain increased by more than 50 percent during the first year, several times more rapidly than industrial production or exports as a whole. Spain is now Portugal's largest export market and its second largest source of imports.[7] Removal of trade barriers between the two countries has clearly increased economic integration.

By the same token, if specialization agreements are effective, economic integration should increase after such agreements are signed. This implies that the percentage of production sold to the partner country or the percentage of total consumption imported from it should rise following the conclusion of an agreement.

In many cases, however, the participating countries may have been increasing trade before signing a specialization agreement. Thus, increases in the percentage of production exported to or consumption imported from the partner country are not sufficient evidence to prove that a specialization agreement has increased economic integration. More telling would be a shift in the trend toward increases in these percentages. For example, if Romania had doubled the rate of increase in the share of total output of locomotives exported to CEMA after the conclusion of the specialization agreement on diesel locomotives in 1976, it could be argued that the agreement was a success.

We have attempted to test the hypothesis that specialization agreements induce such changes, using a simple model. We assume that integration (the percentage of production exported or consumption imported) follows a time trend. After a specialization agreement is signed, this trend should shift upward if the specialization agreement has been effective. We assume that any shift (change in the slope) would be picked up in a multiplicative dummy variable equaling zero before the signing of the agreements and following a time trend after

[7]"Peninsular Pals," *The Economist*, Vol. 303, No. 7504, June 27, 1987, p. 66.

signing. If the coefficient of this variable is positive and significantly different from zero, we can reject the hypothesis that the specialization agreements did *not* increase economic integration. If it is negative and significantly different from zero, we can reject the hypothesis that the specialization agreement *increased* economic integration. Other results are indeterminate.

The mathematical form of the model is[8]

$$Y = \alpha_1 + \beta_1 TIME + \beta_2 DUM + \epsilon , \tag{1}$$

where Y is a univariate transformation of the percentage (P) of output exported to the partner, namely $arcsin(P/100)^{1/2}$; *TIME* is equal to the year minus 1969; *DUM* is a multiplicative dummy variable for time, taking the value of zero before an agreement was signed and *TIME* afterwards; and ϵ is the error term (the usual assumptions are made concerning its distribution). The coefficient of *DUM* , β_2, captures changes in the time trend in Y following the agreement and was used to test for increases in the rate of change in Y.[9] Because specialization is a two-way process—the importing country pledges to rely on the exporter for more of its consumption of the product—we also tested for increases in economic integration in importing countries.

The regression model in Eq. (1) was also used to characterize integration in terms of imports as a percentage of national consumption. In this regression, Y is the arcsin of $(C/100)^{1/2}$, where C is the percentage of total consumption imported from a partner in a specialization agreement.[10] The variables on the right-hand side of the equation are the same.

Estimation and Data

To estimate these equations, we needed figures on production, consumption, and trade in products falling under specialization agreements. Because CEMA countries record trade flows in deviza currencies whose value bears little relation to domestic currencies (with the recent exceptions of Poland and Hungary), and because of the large

[8]This transformation is commonly applied to proportions to stabilize variance (S. Weisberg, *Applied Linear Regression*, 2nd ed., John Wiley & Sons, New York, 1985, p. 134). If the dependent variable is not transformed, hypothesis tests involving parameter estimates are distorted.

[9]Our original equation also included another dummy variable which captured one-time shifts in P after the conclusion of an agreement. We have dropped this variable in our final model to reduce possible multicollinearity.

[10]Consumption = production − exports + total imports.

variation in CEMA trade prices among countries and over time, especially for machinery, we confined ourselves to testing for increases in integration in trade in commodities given in physical units in the yearbooks—generally motor vehicles, railroad equipment, agricultural equipment, machine tools, and some chemicals.

Although the use of physical units rather than values may have biased our results because of changes in the relative value of imported and domestically produced goods over time, there is little reason to believe that these relative values have fluctuated. Another bias may have crept into the analysis because we limited ourselves to commodities recorded in physical units. These tend to be large, e.g., locomotives, or sold in bulk, e.g., chemicals. We believe that this bias is probably small because these sectors include a large share of trade falling under specialization agreements. For example, between 1976 and 1980, over 50 percent of Hungarian trade in products falling under specialization agreements consisted of products in two of these sectors: motor vehicles and agricultural equipment.[11] Consequently, the effectiveness of specialization agreements in increasing economic integration in these sectors may well reflect the overall effectiveness of such agreements in increasing economic integration. On the other hand, this restriction excludes trade in computers, atomic power equipment, and pharmaceuticals—branches in which several important specialization agreements have been signed.

We attempted to develop physical series for production and trade for every product for which both types of data are recorded in the statistical handbooks and for which we had a record of a specialization agreement. The data generally extended from 1960 to 1985 and were taken from the statistical yearbooks of the CEMA countries. In some cases, data points were missing for some years. Statistical data published by these countries are very uneven, and there are substantially more samples from Czechoslovakia, Hungary, and Poland than from the other countries. This problem of bias is partially mitigated by the use of mirror trade statistics. For example, Polish data on locomotive imports from Romania were used to test for the effects of a specialization agreement on Romanian exports of locomotives to Poland. Also, these countries tend to participate in more specialization agreements than Bulgaria and Romania, the two countries for which we have the fewest samples.

Finally, the tests may be somewhat biased because export and import shares are not independent statistics. If a country participates in a multilateral specialization agreement and imports goods from two

[11]Soky, 1976.

countries, their shares of the market are not independent of each other, since they both cannot equal 100 percent. However, in all these cases, the country either produces the commodity itself or imports from sources that do not participate in specialization agreements, so this problem is not as serious as it may appear. For example, both Czechoslovakia and the Soviet Union could have increased their share of the Hungarian market for synthetic rubber by crowding out Western suppliers.

In most of the regressions, the two independent variables, *TIME* and *DUM*, were strongly correlated, introducing multicollinearity into the model. Because multicollinearity tends to increase the size of the standard errors, some results falling into the indeterminate category could have been significant if the independent variables had been more orthogonal.

Results

A summary of our results is given in Table 5. A two-tailed test at a 10 percent level of significance was used to test whether the coefficients on the dummy variables were significantly different from zero. Estimates for motor vehicles are provided in App. C of Skoller and Crane (1988). The other estimates are given in the appendix to this report.

As can be seen, the evidence that specialization agreements have contributed to economic integration is weak. We found evidence of an increase in economic integration following a specialization agreement in only 11 cases out of 103. In 32 cases, the hypothesis that specialization agreements led to an increase in the level of economic integration could be rejected. In other words, in only 11 cases did the trend toward exporting a higher percentage of output or importing a larger share of consumption increase after the signing of a specialization agreement. In 32 cases, it decreased; export and import shares frequently declined. Using these results, it is very difficult to argue that specialization agreements have significantly contributed to economic integration in CEMA.

In the course of generating the data for these regressions we were struck by the variability in trade flows among the CEMA countries. For example, Poland and Czechoslovakia signed specialization agreements concerning the production of tractors. After each of these agreements, trade initially rose but then fell again, indicating that the agreement may have had some short-term impact on integration, but the long-term effects were slight. On the other hand, the agreement between Hungary and the GDR on combines signed in 1976 was

Table 5

STATISTICAL TESTS OF THE EFFECTIVENESS OF SPECIALIZATION AGREEMENTS

Country	Regressions	Coefficients on DUM > 0(a)	Coefficients on DUM < 0(a)
Exports			
Bulgaria	0	0	0
Czechoslovakia	10	1	1
GDR	4	0	3
Hungary	7	1	2
Poland	14	0	7
Romania	1	0	0
USSR	17	3	5
Total	53	5	18
Imports			
Bulgaria	4	1	0
Czechoslovakia	8	0	2
GDR	5	0	1
Hungary	15	3	4
Poland	16	2	7
Romania	0	0	0
USSR	2	0	0
Total	50	6	14

followed by rapid increases in the GDR's share of the Hungarian market.

Part of this variability stems from the ebb and flow of investment. For example, Hungary increased imports of tractors from the Soviet Union fivefold in 1971. Imports from other sources also rose, indicating that Hungary had initiated a large investment program in agriculture in that year. Items such as locomotives and railway cars also often exhibit similar fluctuations, possibly related to five-year plans.

Part of the variability also appears to be due to the startup or cessation of a product line. Despite signing a multilateral specialization agreement in agricultural equipment in 1972, Soviet imports of combines dropped to 5,795 in 1975, from 37,500 in 1974. Bulgarian exports fell from 27,215 combines to zero, while Polish exports fell from 2,000 to none, and East German exports fell by one-third. Soviet production expanded by 10,000 units that year, which partially took up the shortfall. The Soviets may have started a new line in that year or the Bulgarians may have dropped an old one. Nonetheless, the change is

striking: In one year, the Soviets decreased the percentage of combines they imported from 25 to 5 percent.

On the other hand, some trade flows are fairly steady over time, before and after agreements. Romania has been the largest supplier of railway freight cars to other members of CEMA since the late 1950s, long before the 1976 multilateral agreement on freight car production was signed. The pattern of trade in this product changed little after the agreement. Consequently, it is not surprising that the regression analysis for both Hungarian and Polish imports of freight cars from Romania indicates that the specialization agreement did not lead to an increase in Romania's share of these markets.

In some instances, production data highlight the consequences of specialization agreements. A case in point is the sharp decline in Hungary's production of tractors made possible by substituting imports from Czechoslovakia and the Soviet Union for domestic production. Hungary shut down its Red Star tractor factory and turned to foreign sources of supply. According to the regression analysis, Czechoslovakia was able to begin expanding its share of the Hungarian market after signing a specialization agreement. The increases in Romanian production of locomotives also appear to have been made possible by specialization agreements.

Economic Constraints

In many cases, economic constraints appear to have led to the abrogation of specialization agreements. In some cases, imports under specialization agreements appear to have been slashed because of investment cutbacks. For example, Poland decreased its imports of machine tools by more than half at the end of the 1970s. Moreover, imports from specialization partners lost market share in Poland, primarily because the Poles substituted domestic production for CEMA imports.

Austerity has affected more than just imports in the CEMA countries. Romania is in the midst of severe economic difficulties stemming from balance-of-payments problems and economic mismanagement. In tandem with the recession, locomotive production has fallen from more than 300 per year in 1977 to less than 100 in 1985. Exports have declined from more than 200 per year to several dozen. Poland, a major importer (accounting for about 20 percent of Romanian exports), has consequently experienced a decline in deliveries. However, Poland's shortfall has in general been greater than the decline in exports as a whole; a lower percentage of Romanian output is now exported to Poland than was formerly the case.

The most glaring example of the effects of internal economic constraints on exports can be found in Soviet automobile exports to Eastern Europe. From 1976 to 1980, the Soviet Union exported 1,075,571 passenger cars to the other CEMA countries. This number dropped to 396,725 cars between 1980 and 1985—one-third of the former level. Some of these automobiles were diverted to the West to ease Soviet hard currency balance-of-payments pressures stemming from the fall in the price of oil, and some were diverted to the domestic market, but Soviet dissatisfaction with endemic East European trade deficits and supply problems may also have played a role.

This lack of reliability of CEMA partners appears to be one of the primary reasons for the lack of success of specialization and cooperation agreements in increasing economic integration. Instead of providing a buffer for the country when times are tough, trade in commodities under the agreements often appears to be one of the first casualties of economic dislocations. If the CEMA countries cannot depend on their partners to deliver quantities specified in specialization agreements, it is unlikely that they will be willing to eliminate or reduce domestic production.

An interesting example of this is the East German response to the reduction in Soviet automobile exports. Although the Soviet Union had planned to ship about 30,000 vehicles to the GDR in 1986, about 20 percent of domestic supply, only about 1,500 had reportedly been delivered by the end of the year.[12] Meanwhile, Poland had discontinued automobile exports to the GDR at the end of the 1970s. Only Czechoslovakia continued to export substantial quantities of automobiles.[13]

The GDR obviously had not arranged alternative sources of supply, which indicates that it was relying on existing specialization agreements to assure a steady flow of Soviet vehicles. Because the passenger car industry of the GDR is not in a position to easily increase output,[14] the GDR's strategy for coping with its passenger car shortage has been to limit exports of its own cars, continue investment in its domestic automobile industry, and improve ties with Western manufacturers, most notably a new tie-up with Volkswagen to

[12]Karl Stipsicz, "Automobile Industry in the East Bloc: With Western Help Production Is Being Accelerated," *Die Zeit*, 4 April 1986, p. 35.

[13]DPA Report from Berlin, "Soviet Union Drastically Reduces Its Automobile Export to the GDR—Instead of 30,000 Only 1,500 Cars to Be Delivered in 1981," *Der Tagesspiegel*, March 14, 1981, p. 7.

[14]It has suffered from a lack of modernization since World War II. The failure to modernize may be a policy decision taken in part under the expectation that other CEMA countries would supply the GDR with automobiles.

manufacture VW engines. It does not possess enough hard currency to import cars from the West or to pay for the high follow-on costs of establishing repair facilities for them.[15] In this case, the specialization agreement failed to protect the GDR. Thus, it is unlikely that the East Germans will consider phasing out passenger car production in the future.

[15]Stipsicz, 1986.

VI. PROBLEMS WITH SPECIALIZATION AGREEMENTS

Section V argued that, on the basis of quantitative evidence, specialization agreements have had little success in significantly increasing economic integration in CEMA. This section looks at other evidence to evaluate the success of specialization agreements in achieving CEMA policy goals other than economic integration.

INCREASING TRADE IN COMPONENTS

The Complex Program and other CEMA documents have stressed the importance of increasing intra-CEMA trade in components. These statements reflect the perception that CEMA countries could derive substantial cost savings if they were to specialize in components rather than end products. Trade patterns in the Organization for Economic Cooperation and Development (OECD) that exhibit large flows of components are cited as an example of the potential benefits that could be derived. One of the ostensible goals of specialization agreements has been to increase specialization in the production of components, as well as final products. Because component trade is generally considered underdeveloped in intra-CEMA trade, CEMA economic policymakers have hoped that specialization agreements would increase the percentage of components in intrasectoral trade.

East European economists frequently complain that cooperation in the production of parts and subassemblies has been highly unsatisfactory and that trade is biased toward final goods.[1] A Czechoslovak engineer reports that trade in parts and components comprises less than 20 percent of trade in products falling under specialization agreements; he claims this level is far too low.[2] On the other hand, Soviet analysts report that rapid progress has been made in this area.[3]

For most industries, it is difficult to determine which point of view is correct, because information on trade in components and subassemblies is at best fragmentary in the official statistical yearbooks. To shed some light on this matter, we calculated the percentage of trade in

[1]Pecsi, 1981, p. 12; Soky, 1976.

[2]Novak, 1986.

[3]I. Savyolova, "CMEA Member States and Western Countries' Cooperation in Manufacturing Parts and Components," *Foreign Trade*, No. 7, 1980, pp. 28–32.

intermediate products within intra-CEMA trade covered by specialization agreements in the motor vehicle industry. The agreements were assumed to have contributed to increased trade in components if the percentage of components within total trade in this industry increased over time. In view of the size of this industry and its importance in terms of trade in specialized products, these estimates are at least indicative of the effectiveness of specialization agreements.

Table 6 shows that, with the exception of Hungary, the share of components in motor vehicle trade among East European countries, although substantial, has remained more or less the same between 1967 and 1983. Specialization agreements appear to have had little effect on these percentages. The large percentage increase in the 1983 estimate

Table 6

THE PERCENTAGE OF COMPONENTS IN EAST EUROPEAN AND SOVIET MOTOR VEHICLE EXPORTS TO CEMA

(Percent of total motor vehicle exports)[a]

Year	Czechoslovakia	GDR	Hungary	Poland	USSR
1967	41.8	35.3	35.7	51.6	29.9
1968	n.a.	40.5	34.0	38.2	34.1
1969	37.7	40.9	36.2	n.a.	39.4
1970	35.5	34.9	34.8	n.a.	36.9
1971	41.8	32.2	40.1	n.a.	1.6
1972	35.7	30.9	43.1	n.a.	0.4
1973	n.a.	35.1	41.8	n.a.	n.a.
1974	n.a.	41.5	39.4	n.a.	0.0
1975	45.7	42.9	41.3	n.a.	33.8
1976	44.3	43.6	n.a.	n.a.	n.a.
1977	46.2	n.a.	n.a.	n.a.	32.9
1978	45.1	n.a.	n.a.	n.a.	0.0
1979	49.0	30.6	49.2	n.a.	36.1
1980	68.3	32.1	48.7	4.1	33.1
1981	41.9	32.6	48.7	46.1	n.a.
1982	38.4	34.8	47.1	n.a.	n.a.
1983	39.9	31.1	46.5	n.a.	64.1

SOURCE: *Bulletin of Statistics on World Trade in Engineering Products*, United Nations, Economic Commission for Europe, various years.

[a]Data for Bulgaria and Romania are not available. Percentages are based on current-year dollar values. Data on parts are the residual of total motor vehicle exports minus the sum of finished vehicles, with the following exceptions: A new category exclusively for parts was added for the GDR, Hungary, and the Soviet Union in 1979, and for Czechoslovakia in 1982.

for the Soviet Union is the result of drastically reduced Soviet exports of motor vehicles to CEMA, rather than increased levels of component trade.

Anecdotal evidence also indicates that despite an official campaign to increase exports of components, there appears to have been little progress in this area. As noted in Sec. V, national resistance to becoming more dependent on foreign markets is strong, as a result of the periodic reductions in supply. Because production, not just the satisfaction of final demand, is crucially dependent on obtaining supplies of components on time and of the requisite quality, countries are even more reluctant to become dependent on a CEMA partner for components than they are for final goods.

This is reflected in the case of one Hungarian firm. Although Hungary was eager to increase production of automobile components produced under a cooperation agreement that was intended to improve capacity utilization and to increase imports of the automobiles shipped in exchange, its partner maintained its own production of the parts at the cost of a sizable investment. Nevertheless, vehicles earmarked for sale in the West were invariably fitted with the Hungarian parts, whereas those fitted with domestic ones were retained for the home market.[4] In other words, despite the cost, expense, and even poorer quality of domestic production, the CEMA producer still insisted on having a domestic source of supply.

Lack of Incentives

The reasons for this wariness include the lack of incentives for foreign suppliers to deliver their committed goods on schedule or in the requisite quality. Bonuses are awarded for meeting sales, cost-reduction, and profits targets. These targets are usually easier to meet by concentrating on the domestic market. Moreover, if export targets are fulfilled late or with the wrong assortment, enterprise managers face no substantial penalties.

Factory managers are also loath to give up the production of products, including components,[5] for which the production lines have been set up, the labor force trained, and sources of materials supply established. Turning to another country for components may introduce problems.

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[4]Adam Torok, "Intra-CMEA Relations of the Hungarian Engineering Enterprises," in Andras Inotai (ed.), *The Hungarian Enterprise in the Context of Intra-CMEA Relations,* Institute of the World Economy, Budapest, 1986, pp. 61–68.

[5]"Interview with Emil Misovsky," 1972, pp. 17–19.

Because specialization and cooperation agreements are primarily made by the political authorities, rather than the enterprises themselves, and because they are often concluded with a single, specific supplier in mind, the supplier of components often holds a monopoly.[6] This removes incentives to respond to the demands of the buyer, who is often locked into a state-specified supplier, even though his demands are not adequately met by that supplier. The buyer's only option is to continue to buy and complain.[7]

Administrative relations between CEMA countries also contribute to delivery delays. Orders must be placed, complete with detailed technological specifications, in advance—sometimes even before the technical requirements have been worked out. Modifications to existing orders are very cumbersome.[8]

These supply shortfalls often lead to a fall in capacity utilization for the country awaiting the imported input. Some items can be replaced by hard currency imports, but these are usually costly and involve considerable delays because of the difficulty of obtaining hard currency, especially during times of balance-of-payments problems.

Coordination of Plans

Poor progress in implementing specialization agreements and increasing trade in components is also partly the result of poor plan coordination. Poor planning during the development phase of the agreements decreases the growth rate of production. In the motor vehicle industry, governments have signed some specialization agreements without taking into account the conditions and costs of production.[9] This occurred during the construction of the Madara truck plant in Bulgaria, which had entered into a specialization and cooperation agreement with Czechoslovakia. Planned production levels could not be met, partly because the machinery for building certain parts (gears for the Perkins diesel engine and radial gears for the final reduction assembly of the Skoda rear axle) was more than 15 years old and had undergone two or more overhauls. This obsolete machinery could not meet the technical demands of the new agreement.[10]

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[6]Torok, 1986.

[7]Bauer and Soos, 1979, pp. 297–298.

[8]Torok, 1986.

[9]Gyorgy Szelecki, "The Machine Industry's Experience in Production Specialization with Socialist Countries," *Villaggazdasag*, November 3, 1978, p. 3.

[10]Angel Mandazhiev, "The Madara Truck Plant: A Project with Many Unsolved Questions," *Ikonomicheski Zhivot*, July 2, 1975, p. 4.

Another consequence of poor planning is that component production is not synchronized with demand. In Poland, demand for Fiat 126p spare parts exceeds production capacities, but growth in spare-parts production is limited by a lack of funding for the purchase of machinery to increase production capacity.[11]

IMPROVING THE TECHNICAL LEVEL OF PRODUCTION

Another goal of specialization agreements has been to improve the technical level of production by permitting countries to concentrate research and development (R&D) funds on particular industries and products. This R&D base, coupled with the experience of producing in large volumes, was expected to lead to improvements in the quality and technical level of products.

Many of the products manufactured under specialization and cooperation agreements are probably technically superior to those they have replaced. For example, the RYAD computers introduced under the 1969 specialization agreement are markedly superior to former products.[12] Moreover, East German combines are probably of better quality than the Czech and Soviet combines they replaced; Hungarian buses are of better quality than the old East German and newer Polish Berliet buses; and Polish construction machinery is of a higher technical level than the old Soviet products. However, a better test of technical level is sales on OECD and Third World markets. In general, success in this area has been limited.

Table 7 indicates the extent to which products manufactured under specialization agreements by the GDR are confined to CEMA markets. Although more than one-third of East German exports have gone to the Soviet Union in recent years,[13] the share of exports of products falling under specialization agreements has been far higher, in many cases exceeding one-half of the exports of the product (Table 7). The GDR also exported sizable quantities of these goods to other members of CEMA as well, so the share of these products exported to the West must have been low.

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[11]Jerzy Dobosz, "Auto Industry Production Plans, Problems Summarized," *Motoryzacja*, No. 5, 1984, pp. 117–123.

[12]Goodman, 1979.

[13]Because of the poor quality of East German trade statistics, it is difficult to estimate the exact proportion of exports going to the Soviet Union. However, ruble exports and imports have been roughly in balance in the past few years, so based on figures for the share of total trade conducted with the Soviet Union, exports to the Soviet Union must have accounted for more than one-third of GDR exports.

Table 7

SHARE OF SELECTED GDR EXPORTS OF SPECIALIZED PRODUCTS TO THE USSR

Product	1980	1981	1982	1983	1984
Machines for processing plastics	61.4	63.3	71.5	77.6	76.6
Machine tools	42.3	63.7	62.2	65.9	70.0
Fishing vessels	100.0	100.0	100.0	100.0	100.0
Office equipment	51.6	64.1	59.9	46.1	40.1
Textile machines	33.1	39.9	38.8	43.2	46.8
Agricultural machines and tractors	54.1	60.9	54.4	58.4	59.0
Lifting and handling devices	54.7	55.2	48.1	55.1	53.7
Plant protection agents	42.1	46.4	41.5	41.3	43.7

SOURCE: Meier, 1986.

Other East European producers have had similar experience marketing products manufactured under specialization agreements on world markets. For example, only 10 to 20 percent of Hungary's Ikarus bus exports and less than 30 percent of Czech trucks go to non-CEMA markets.

The lack of East European success in selling goods produced under specialization agreements on Western markets is not the result of pricing. East European machinery and transport equipment is two to four times cheaper than Western machinery (on the basis of weight).[14] Rather, these goods lack the quality, operating rates, and service support of their Western counterparts. These are technical deficiencies and are partly accounted for by the lack of incentives to introduce technical innovations into production, especially the lack of an effective pricing system. In other words, despite the superior technical level of some of these products in comparison with the products they replaced, they still do not achieve world market standards. They occupy a mid-level position between unexportable domestically produced products and products sold on world markets.

[14]Kazimierz Poznanski, "Competition between Eastern European and Developing Countries in the Western Market for Manufactured Goods," in *East European Economies: Slow Growth in the 1980's*, Vol. II, Joint Economic Committee of Congress, U.S. Government Printing Office, Washington, D.C., 1986.

Prices and Incentives

The CEMA mechanism for setting prices for specialized production is supposedly the same as that for unspecialized products. Prices are supposed to be set on the basis of world prices for comparable goods, with some allowances made for transportation cost differentials and Western market fluctuations, averaged over the previous five years.[15] In practice, however, most prices are set in trade negotiations conducted by members of the foreign trade organizations (FTOs). These individuals are concerned less with the price of the individual items than with the overall terms of trade (relative prices between exports and imports) in their area.[16] Enterprises do not negotiate directly with the purchasers of their products and often are not even present during price negotiations. Consequently, enterprises have difficulty obtaining adequate compensation for improvements in products, because, although East European consumers are willing to pay price differentials for higher levels of quality, CEMA FTOs and producers frequently are not.[17] Consequently, producers have to fight to get new products accepted; they are not forced by their customers to modernize their production line as producers are in the West. Even in electronics, a sector of rapid technological innovation in the West, Hungarian producers find that their CEMA clients prefer the products they have been using to newer (possibly higher priced) products.[18]

CEMA producers also lack incentives for process innovations. In most countries, bonuses are awarded for fulfilling sales targets, rather than for increasing profits. According to a Polish economist, this has led to an emphasis on capacity utilization and improvements in quality control, rather than cost reductions, in the Polish-Czech bilateral agreement on tractors, often considered a successful agreement.[19]

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[15]A. Velharticka, "Extensive Methods Show Inadequate Results," *Hospodarske Noviny* (in Czech), No. 27, 1986, p. 3.

[16]Maria Babosik, "The FTOs in Intra-CMEA Cooperation," in Andras Inotai (ed.), *The Hungarian Enterprise in the Context of Intra-CMEA Relations,* Institute of the World Economy, Budapest, 1986, pp. 87–92.

[17]Margit Racz, "A Summary," in Andras Inotai (ed.), *The Hungarian Enterprise in the Context of Intra-CMEA Relations,* Institute of the World Economy, Budapest, 1986, p. 12.

[18]Torok, 1986.

[19]Bogdan Zukowski, "Cooperation Inside the CMEA Fails Expectations," *Polityka: Export-Import Supplement*, No. 18, September 1985, p. 14.

Forced Substitution

Uneven technical levels and quality are also partly the result of poor-quality components. Problems in component quality can spoil the quality of the entire product, as has happened in the Hungarian bus industry. Hungarian manufacturers have had to make technical compromises when installing front axles imported from the Soviet Union. The Soviet manufacturer turns out enormous series of front axles for trucks and is unwilling to make more than a few essential adaptations when making the production runs for bus axles, since the Ikarus contract is much smaller.[20]

Uneven quality leads to marketing problems. The CEMA market, with its lower requirements, is unwilling to pay for higher-quality components. The Western market, with its higher requirements, is unwilling to accept the technical compromises used in installing the Soviet components. For example, the Hungarians must substitute parts and subassemblies either procured outside CEMA or produced under Western license in small batches in order to sell their buses in the West.[21]

Lack of effective cooperation can also cause problems because it results in ad hoc technical solutions. For instance, the GDR was originally to produce small buses and Hungary was to specialize in larger ones. However, the GDR reneged, so Hungary must produce smaller models of the Ikarus bus as well. These smaller models are poorly designed and are based on a truck chassis, rather than a separately designed bus chassis. As a result, they are not marketable in the West and are also not highly regarded in Eastern Europe. This compromise has lowered the standards of the Ikarus lines and has led to the costly production of inferior products.[22]

Bureaucratic Problems

The manner in which specialization agreements are negotiated and implemented also works to retard technological innovation. Gacs notes that negotiations become so drawn out that in electronics the technology is often outdated before an agreement is signed.[23] Enterprise managers in engineering, light industry, and electronics all complain

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[20]Marton Tardos (ed.), *Enterprise Behavior, Enterprise Environment*, Koezgazdasagi es Jogi Koenyvkiado, Budapest, 1980.

[21]Bauer and Soos, 1979, p. 292.

[22]Tardos, 1980.

[23]Gacs, 1985, p. 9.

that the lack of direct contacts between enterprises has retarded product development.[24]

MULTILATERALIZATION OF TRADE FLOWS

Hard Currency and Ruble Inputs

Trade in capitalist markets also influences the terms of exchange for specialized products. According to Velharticka:

> Products which are capable of fulfilling the function of payments in capitalist markets are also considered as "hard components" in the socialist market and are only exchanged for similarly "hard" goods or even hard currency. Naturally, the interest in accepting long-term commitments for delivery of such products to socialist nations is weak.[25]

The lack of fungibility between ruble and dollar payments has had very high costs for the CEMA countries. For example, a large share of the raw materials (e.g., raw rubber or steel cord) in Poland's tire industry is imported from dollar-market countries. A lack of hard currency for these materials is one major reason that the production facilities at the Olsztyn tire plant in Poland do not operate at peak capacity.[26] Poland is involved in a number of bilateral specialization agreements in the production of tires, so the Polish tire shortage affects other CEMA countries. For example, Poland and Hungary have a bilateral specialization agreement in tires—Hungary produces truck tires and Poland produces automobile tires. Because of delays in Polish deliveries of automobile tires in 1979, the Hungarians limited their exports of rubber products for trucks, including tires.[27] Both countries suffered from the shortfall in production, but the insistence on barter or ruble payments prevented Poland from trading its tires for currency which could have been used to buy the necessary inputs.

Another major hindrance is the inability to compare prices between East and West or to be compensated for hard currency inputs. Under these conditions, countries are unwilling to incorporate subassemblies originating from outside CEMA into products to be sold at home or in the CEMA market; the advantages offered by Western subassemblies

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[24]Andras Inotai (ed.), *The Hungarian Enterprise in the Context of Intra-CMEA Relations,* Institute of the World Economy, Budapest, 1986.

[25]Velharticka, 1986.

[26]Dariusz Piatkowski, "Interview with Manager Eng Henryk Olejniczak, Director of the Stomil Association of Rubber Products Industries," *Zcyie Warszawy,* December 14, 1978, pp. 1, 9.

[27]Edward Molendowski, "Polsko-Wegierska wymiana i wspolpraca," *Handel Zagraniczny,* 7/1981, pp. 19–22.

cannot be incorporated into a standard design.[28] Consequently, one of the major advantages that accrues from trade—the purchase of products from the least-cost supplier—is often not exploited in specialized production.

CEMA Trade Quotas

Producers of specialized goods face some of the same problems in juggling their intra-CEMA trade receipts as they do in managing their hard currency/ruble flows. As noted above, despite the introduction of specialization agreements, foreign trade negotiations still lead to "structural bilateralism," balancing trade by commodity group. Consequently, specialized producers frequently cannot expand exports to their full potential because their own authorities do not want the necessary offsetting imports, yet they cannot use a trade surplus in the specialized commodity to pay for desired imports from another CEMA country. Thus, one of the purposes for which specialization agreements were designed, increasing multilateralism in intra-CEMA trade, has not been achieved.

CONCLUSIONS

The evidence in Sec. V indicates that specialization agreements have not had great success in increasing economic integration. The statistical analysis of changes in trade flows following the signing of specialization agreements provided evidence of an increase in economic integration in only 11 cases out of 103. In 32 cases, the hypothesis that specialization agreements led to an increase in the level of economic integration could be rejected. Although some increases in the percentage of output traded or consumption imported occurred after the signing of specialization agreements, trade flows continued to fluctuate widely. Specialization agreements do not appear to provide states with a buffer during times of recession; rather, participating countries are often quick to reduce imports or exports during times of austerity, despite the existence of agreements. Because specialization agreements frequently fail to provide reliable sources of supply, CEMA governments do not rely on them fully, but often seek alternative sources of supply.

Specialization agreements do not appear to have induced marked increases in the share of components in CEMA trade. They often act as a drag on technological innovation despite the technical superiority

[28]Bauer and Soos, 1979.

of many specialized products vis-à-vis the domestically produced goods they replace. They also have not contributed to the multilateralization of trade flows. In short, specialization agreements have not been successful in achieving many of the policy goals for which they were designed.

Appendix

RESULTS OF STATISTICAL TESTS

This appendix presents the results of statistical tests of the hypothesis that the share of total output exported to a CEMA partner or the share of total consumption imported from a CEMA partner increases after a specialization agreement has been signed. The dependent variable, denoted by the recipient country, is the percentage of output exported by the producing country to the recipient or consumption imported from the partner country (expressed as the arcsin of the square root of the percent divided by 100). TIME is an integer variable, negative or positive, which increases by 1 in each succeeding year (1969 = 0), and DUM is a multiplicative dummy variable used to test whether integration accelerated after the signing of a specialization or cooperation agreement.[1] Numbers in parentheses are the t-statistics associated with the coefficients above them. The R-square is unadjusted. Corr(DUM x TIME) is the correlation between the two independent variables, DUM and TIME. An asterisk (*) after the DUM variable indicates that the coefficient is positive and significantly different from zero, using a one-tailed test and a 5 percent cutoff region, implying that after the specialization agreement was signed the trend toward integration accelerated. A double asterisk (**) indicates that the coefficient is negative and significant at the 5 percent level, implying that after the specialization agreement was signed, the two economies became less integrated, not more.

[1]DUM equals TIME for each year after a specialization agreement has been signed; otherwise, it equals zero. This variable is used to test for changes in the slope.

REGRESSIONS ON CHANGES IN THE SHARE OF OUTPUT EXPORTED BY PARTNERS TO SPECIALIZATION AGREEMENTS

MACHINE TOOLS

Czechoslovakian Exports of Machine Tools to:

GDR = .153 − .008 × TIME + .008 × DUM
(15.55) (−1.17) (1.04)
R-square = .1209 F = 1.10 Observations = 19 Corr(DUM × TIME) = .9897

HU = .119 + .005 × TIME − .006 × DUM
(18.1) (1.049) (−1.26)
R-square = .1831 F = 1.79 Observations = 19 Corr(DUM × TIME) = .9897

PO = .165 + .017 × TIME − .018 × DUM
(9.49) (1.35) (−1.37)
R-square = .1054 F = .94 Observations = 19 Corr(DUM × TIME) = .9897

SU = .245 + .002 × TIME − .001 × DUM
(19.4) (.39) (−.21)
R-square = .0253 F = .21 Observations = 19 Corr(DUM × TIME) = .9453

Hungarian Exports of Machine Tools to:

BU = .078 + .003 × TIME − .0002 × DUM
(5.54) (1.32) (−.07)
R-square = .1482 F = 1.48 Observations = 20 Corr(DUM × TIME) = .6989

CZ = .315 + .007 × TIME − .007 × DUM
(16.7) (1.58) (−1.19)
R-square = .1570 F = 1.58 Observations = 20 Corr(DUM × TIME) = .9351

PO = .090 − .004 × TIME + .007 × DUM
(4.41) (−0.95) (1.17)
R-square = .0748 F = 0.69 Observations = 20 Corr(DUM × TIME) = .8589

SU = .266 − .025 × TIME + .028 × DUM*
(9.63) (−4.16) (3.66)
R-square = .5045 F = 8.65 Observations = 20 Corr(DUM × TIME) = .8589

Polish Exports of Machine Tools to:

BU = .076 + .003 × TIME − .001 × DUM
(10.6) (2.17) (−.43)
R-square = .5185 F = 12.38 Observations = 26 Corr(DUM × TIME) = .9343

CZ = .151 + .005 × TIME − .010 × DUM**
(20.4) (3.75) (−5.01)
R-square = .5821 F = 16.02 Observations = 26 Corr(DUM × TIME) = .9343

GDR = .160 + .013 × TIME − .018 × DUM**
(12.7) (5.07) (−5.38)
R-square = .5602 F = 14.65 Observations = 26 Corr(DUM × TIME) = .8960

HU = .056 − .0003 × TIME + .002 × DUM
(10.9) (−0.32) (1.66)
R-square = .2617 F = 4.08 Observations = 26 Corr(DUM × TIME) = .8745

RO = .034 + .005 × TIME − .004 × DUM**
(7.98) (5.94) (−3.15)
R-square = .6976 F = 26.53 Observations = 26 Corr(DUM × TIME) = .8745

SU = .165 + .014 × TIME − .013 × DUM**
(9.59) (4.14) (−2.66)
R-square = .5628 F = 14.8 Observations = 26 Corr(DUM × TIME) = .9384

AGRICULTURAL EQUIPMENT

East German Exports of Combines to:

CZ = .394 + .028 × TIME − .022 × DUM**
(8.12) (2.58) (−1.86)
R-square = .3213 F = 3.55 Observations = 18 Corr(DUM × TIME) = .8490

Soviet Exports of Combines to:

BU = .120 − .004 × TIME + .003 × DUM
(15.0) (−2.04) (1.18)
R-square = .2522 F = 3.71 Observations = 25 Corr(DUM × TIME) = .9226

CZ = .136 − .002 × TIME − .003 × DUM
(11.5) (−.73) (−.82)
R-square = .4174 F = 7.88 Observations = 25 Corr(DUM × TIME) = .9226

HU = .229 + .019 × TIME − .034 × DUM**
(6.36) (2.44) (−3.24)
R-square = .3638 F = 6.29 Observations = 25 Corr(DUM × TIME) = .9226

PO = .052 + .001 × TIME + .001 × DUM
(3.25) (.30) (.39)
R-square = .1236 F = 1.55 Observations = 25 Corr(DUM × TIME) = .9226

Soviet Exports of Tractors to:

BU = .094 − .002 × TIME + .004 × DUM*
(18.2) (−2.01) (1.84)
R-square = .2347 F = 2.15 Observations = 17 Corr(DUM × TIME) = .9226

CZ = .045 − .005 × TIME + .008 × DUM*
(12.4) (−7.17) (5.12)
R-square = .7860 F = 25.71 Observations = 17 Corr(DUM × TIME) = .9226

GDR = .084 + .004 × TIME − .004 × DUM**
(11.2) (2.14) (−1.83)
R-square = .1766 F = 2.36 Observations = 25 Corr(DUM × TIME) = .9226

HU = .097 + .001 × TIME − .002 × DUM
(17.8) (.85) (−1.29)
R-square = .1002 F = 1.17 Observations = 24 Corr(DUM × TIME) = .9226

PO = .055 − .001 × TIME + .010 × DUM*
(10.2) (−1.23) (6.03)
R-square = .8804 F = 80.97 Observations = 25 Corr(DUM × TIME) = .9226

RO = .016 − .002 × TIME + .0004 × DUM
(13.0) (−7.16) (.75)
R-square = .8743 F = 48.70 Observations = 17 Corr(DUM × TIME) = .9226

RAILWAY EQUIPMENT

Romanian Exports of Locomotives to:

PO = .342 + .015 × TIME − .020 × DUM
(6.23) (1.26) (−1.34)

R-square = .0778 F = 0.93 Observations = 25 Corr(DUM × TIME) = .8593

Polish Exports of Railway Freight Cars to:

CZ = .050 + .006 × TIME − .0003 × DUM
(4.81) (3.60) (−.111)

R-square = .5553 F = 16.23 Observations = 29 Corr(DUM × TIME) = .8098

HU = .160 − .002 × TIME − .006 × DUM
(6.03) (−.918) (−.523)

R-square = .1591 F = 2.46 Observations = 29 Corr(DUM × TIME) = .8098

SU = .566 + .008 × TIME − .0003 × DUM
(59.8) (5.56) (−0.13)

R-square = .7506 F = 39.13 Observations = 29 Corr(DUM × TIME) = .8098

Polish Exports of Railway Passenger Cars to:

SU = .767 − .030 × TIME − .033 × DUM**
(16.9) (−4.44) (−3.12)

R-square = .8432 F = 67.24 Observations = 28 Corr(DUM × TIME) = .8098

REGRESSIONS ON THE SHARE OF CONSUMPTION IMPORTED FROM PARTNERS TO SPECIALIZATION AGREEMENTS

MACHINE TOOLS

Czechoslovakian Imports of Machine Tools from:

GDR = .163 + .001 × TIME − .005 × DUM
(14.06) (.17) (−.52)
R-square = .2695 F = 2.95 Observations = 19 Corr(DUM × TIME) = .9897

HU = .158 + .005 × TIME − .006 × DUM
(15.8) (.647) (−.75)
R-square = .0593 F = .50 Observations = 19 Corr(DUM × TIME) = .9897

PO = .142 + .000 × TIME − .004 × DUM
(14.7) (.019) (−.501)
R-square = .4154 F = 5.68 Observations = 19 Corr(DUM × TIME) = .9897

SU = .186 + .013 × TIME − .010 × DUM**
(12.6) (2.36) (−1.90)
R-square = .2921 F = 3.30 Observations = 19 Corr(DUM × TIME) = .9453

Hungarian Imports of Machine Tools from:

BU = .213 + .003 × TIME + .017 × DUM*
(10.9) (.85) (3.71)
R-square = .6678 F = 17.09 Observations = 20 Corr(DUM × TIME) = .6989

CZ = .317 − .001 × TIME + .007 × DUM
(9.65) (−.15) (.66)
R-square = .1104 F = 1.06 Observations = 20 Corr(DUM × TIME) = .9351

PO = .136 + .0003 × TIME + .008 × DUM
(7.64) (.09) (1.60)
R-square = .4060 F = 5.81 Observations = 20 Corr(DUM × TIME) = .8589

SU = .259 + .009 × TIME + .005 × DUM
(7.88) (1.22) (.49)
R-square = .4036 F = 5.75 Observations = 20 Corr(DUM × TIME) = .8589

Polish Imports of Machine Tools from:

BU = .112 + .010 × TIME − .006 × DUM**
(9.65) (4.32) (−1.75)
R-square = .7219 F = 29.85 Observations = 26 Corr(DUM × TIME) = .9343

CZ = .153 + .003 × TIME − .005 × DUM**
(23.0) (2.31) (−2.80)
R-square = .2710 F = 4.27 Observations = 26 Corr(DUM × TIME) = .9343

GDR = .167 + .0002 × TIME − .002 × DUM
(18.3) (.12) (−.94)
R-square = .1329 F = 1.76 Observations = 26 Corr(DUM × TIME) = .8960

HU = .062 − .001 × TIME + .0002 × DUM
(7.08) (−.535) (.085)
R-square = .0380 F = 0.45 Observations = 26 Corr(DUM × TIME) = .8745

RO = .065 + .010 × TIME − .006 × DUM**
(5.83) (4.38) (−2.07)
R-square = .5851 F = 16.22 Observations = 26 Corr(DUM × TIME) = .8745

SU = .283 + .025 × TIME − .028 × DUM**
(13.2) (5.90) (−4.61)
R-square = .6465 F = 21.03 Observations = 26 Corr(DUM × TIME) = .9384

AGRICULTURAL EQUIPMENT

Czechoslovakian Imports of Combines from:

GDR = .501 + .050 × TIME + .006 × DUM
(11.3) (4.56) (.44)
R-square = .8448 F = 54.41 Observations = 23 Corr(DUM × TIME) = .8804

Hungarian Imports of Combines from:

GDR = .155 + .069 × TIME + .019 × DUM
(2.39) (3.95) (1.15)
R-square = .9100 F = 70.76 Observations = 17 Corr(DUM × TIME) = .9411

SU = 1.39 − .064 × TIME − .031 × DUM**
(21.6) (−3.71) (−1.85)
R-square = .9223 F = 83.05 Observations = 17 Corr(DUM × TIME) = .8282

East German Imports of Tractors from:

SU = .456 + .038 × TIME + .032 × DUM
(8.77) (2.81) (1.65)
R-square = .8424 F = 34.73 Observations = 16 Corr(DUM × TIME) = .9310

Hungarian Imports of Tractors from:

CZ = .418 − .023 × TIME + .023 × DUM*
(12.3) (−2.99) (2.15)
R-square = .4338 F = 6.51 Observations = 20 Corr(DUM × TIME) = .9488

SU = .818 + .038 × TIME − .018 × DUM**
(30.5) (6.94) (−2.55)
R-square = .8282 F = 40.98 Observations = 20 Corr(DUM × TIME) = .8282

RAILWAY EQUIPMENT

Polish Imports of Railway Freight Cars from:

BU = .078 + .008 × TIME − .013 × DUM**
(5.63) (2.51) (−3.49)
R-square = .3731 F = 6.55 Observations = 25 Corr(DUM × TIME) = .8098

CZ = .069 + .015 × TIME − .004 × DUM
(2.35) (2.35) (−.56)
R-square = .3696 F = 6.15 Observations = 24 Corr(DUM × TIME) = .8098

RO = .136 + .003 × TIME − .007 × DUM
(5.16) (.47) (−.94)
R-square = .0549 F = 0.61 Observations = 24 Corr(DUM × TIME) = .8098

Hungarian Imports of Railway Freight Cars from:

PO = .358 − .017 × TIME − .003 × DUM
(6.42) (−1.17) (−0.23)
R-square = .4073 F = 4.12 Observations = 15 Corr(DUM × TIME) = .8972

RO = .481 − .0002 × TIME − .001 × DUM
(6.12) (−0.01) (−0.04)
R-square = .0007 F = 0.00 Observations = 16 Corr(DUM × TIME) = .8972

Hungarian Imports of Locomotives from:

SU = .324 + .074 × TIME − .045 × DUM**
(5.45) (4.65) (−2.93)
R-square = .6862 F = 14.22 Observations = 16 Corr(DUM × TIME) = .8972

Polish Imports of Locomotives from:

CZ = .072 + .008 × TIME + .002 × DUM
(2.73) (1.44) (.24)
R-square = .3205 F = 5.19 Observations = 25 Corr(DUM × TIME) = .8098

GDR = .110 − .015 × TIME + .012 × DUM*
(4.06) (−2.54) (1.73)
R-square = .2465 F = 3.60 Observations = 25 Corr(DUM × TIME) = .8098

RO = .199 + .014 × TIME − .005 × DUM
(4.72) (1.55) (−.41)
R-square = .2049 F = 2.83 Observations = 25 Corr(DUM × TIME) = .8098

SU = .240 + .036 × TIME − .015 × DUM**
(7.96) (5.45) (−1.83)
R-square = .7344 F = 30.41 Observations = 25 Corr(DUM × TIME) = .8098

CHEMICALS

Hungarian Imports of Synthetic Rubber from:

CZ = .238 + .034 × TIME − .052 × DUM**
(8.13) (5.08) (−5.83)
R-square = .6638 F = 17.77 Observations = 21 Corr(DUM × TIME) = .9787

SU = .795 + .019 × TIME − .011 × DUM
(23.3) (2.35) (−1.01)
R-square = .5217 F = 9.27 Observations = 20 Corr(DUM × TIME) = .9164

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