Specialization and Cooperation Agreements within the Motor Vehicle Industry of the Council for Mutual Economic Assistance

Deborah Skoller, Keith Crane

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PREFACE

This Note is a case study of specialization and cooperation agreements in the motor vehicle industry of the Council for Mutual Economic Assistance, CEMA. It examines the substantive form of the agreements and the mechanisms by which they are implemented. It also outlines the administrative organization of the motor vehicle industry on a country-by-country basis for Eastern Europe and the Soviet Union. The study explores several hypotheses concerning the effectiveness of specialization and cooperation agreements in increasing economic integration in the motor vehicle industry.

The Note was prepared as part of a larger project describing the extent and composition of CEMA specialization agreements and assessing their effectiveness in increasing CEMA economic integration. It is a companion document to RAND Report R-3518, *Specialization Agreements in the Council for Mutual Economic Assistance*, by Keith Crane and Deborah Skoller, February 1988. It is designed to assist analysts who study the Soviet bloc in tracing international and interindustry ties between the countries of the European CEMA. The Note is part of a continuing research program on International Economic Policy, within RAND's National Security Research Division. The principal focus of that program is the interface between international economics and national security issues.
SUMMARY

One of the primary goals of the Council for Mutual Economic Assistance, CEMA, has been to increase specialization and cooperation in industrial production. Member countries specialize in manufacturing a specific type of product to satisfy not only their own demands, but also the demands of the other CEMA countries. Nonspecializing countries cooperate with specialized producers by contributing components or technical assistance. Specialization and cooperation are expected to lead to lower production costs, increased output, better-quality products, and superior technical features.

The main instruments for pursuing specialization and cooperation are treaties called "specialization and cooperation agreements." These agreements are based on recommendations made by CEMA organs or resolutions between individual countries that specify who is to produce what products within a particular industry.

This Note presents a case study of specialization and cooperation agreements in the motor vehicle industry. The object of the study is threefold:

1. To describe the extent and composition of specialization and cooperation agreements in this industry.
2. To determine the mechanisms through which they are drafted and implemented.
3. To assess the effectiveness of the agreements in achieving their goals.

Our findings indicate that the motor vehicle industry has been a major sector for specialization efforts. Agreements cover all types of motor vehicle commodities, including both finished vehicles and components. Agreements in this industry are both multilateral and bilateral, the latter type dominating.
Virtually all of the specialization agreements in the motor vehicle industry involve exchanges of finished and intermediate motor vehicle products, not one-way flows. Countries pay for imports of motor vehicles with exports of motor vehicles or their components; payment appears to be in kind within the industry. This pattern of trade appears to be a consequence of the CEMA pricing system.

Adherence to bilateral balancing is ultimately disadvantageous because it limits technological advancement. Countries are unable to fully exploit economies of scale because of quantity constraints imposed by balancing.

All the CEMA countries participate to varying degrees in both bilateral and multilateral agreements, with the exception of Romania, which has limited its participation to a very few bilateral agreements. The relative frequencies with which the countries participate has not changed substantially during the past two decades. Thus, it appears that no shift in national willingness or ability to participate has occurred since the agreements were initially promoted.

Since specialization and cooperation agreements are documents which embody the directions of CEMA-wide production strategies, it might be supposed that their development would be carried out mainly at the upper administrative levels. This has only been true, however, for the development and implementation of multilateral agreements within the motor vehicle industry.

Bilateral agreements are developed and implemented by the individual states; they are frequently drafted at the level of the branch ministry. Contacts between the ministries occur through intergovernmental commissions (or committees) on economic, scientific, and technical cooperation. Bilateral agreements are concluded according to the decisions of the intergovernmental commissions.

It appears that specialization and cooperation agreements have had very limited success in reducing duplication. Production of all motor vehicle types is still widely spread across the CEMA countries.
Economic integration in the CEMA motor vehicle industry should have increased if the agreements had been effectively implemented. Statistical tests of this hypothesis indicate that the effectiveness of specialization agreements has generally been limited. The hypothesis that specialization agreements do not increase economic integration could be rejected at the 5 percent level of significance for only 5 of 41 specialization agreements. The alternative hypothesis, that specialization agreements increase economic integration, could be rejected in 13 of the 41 cases.

Soviet/East European trade in automobiles has actually declined despite the existence of numerous specialization and cooperation agreements. This decline has resulted partly from larger shipments of motor vehicles to Western markets, but also from absolute declines in exports in the 1980s. Given the unreliability of motor vehicle suppliers in fulfilling specialization commitments, it is understandable that individual countries are unwilling to forgo national production capabilities despite the existence of an agreement.

A few specialization agreements have met with notable success. Czechoslovakia significantly increased the share of trucks it produced for export to the Soviet Union, and the latter significantly increased the share of imported Czech trucks in its overall consumption following the signing of an agreement. In this case, a specialization agreement may have contributed to closer economic ties between Czechoslovakia and the Soviet Union in trucks. Many of the technological advancements in the motor vehicle industry have occurred through substantial inputs of Western technology in the form of licenses and car-making equipment.

Many specialization and cooperation agreements have been ineffectively implemented because of unreliable deliveries, poor planning during agreement development, raw material shortages, obsolete production equipment, and lack of incentives for enterprises to cooperate effectively. In view of these obstacles, it appears that specialization and cooperation agreements have not provided a successful solution to the problem of increasing integration and enhancing industrial production within the motor vehicle industry in CEMA.
ACKNOWLEDGMENTS

The authors wish to thank Vladimir Sobell and the staff of Radio Free Europe, Nora Monk of The RAND Corporation, and Patrick Gutman of the Universite de Paris for providing information on the CEMA motor vehicle industry. We also benefited from the insightful comments provided by Steven W. Popper on earlier versions of this study.
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I. INTRODUCTION

SPECIALIZATION AND COOPERATION AGREEMENTS

Since the early 1970s, the Council for Mutual Economic Assistance, CEMA, has rigorously promoted industrial specialization and cooperation as a means of furthering economic integration among its Soviet and East European members.¹ The Council defines production specialization and cooperation in the CEMA document "The Principles of the Socialist International Division of Labor" as the concentration of production of the same kinds of commodities in one or a few socialist countries to satisfy the needs of all interested countries.² Each country specializes in manufacturing a specific type of product to satisfy not only its own needs, but also the needs of the other CEMA countries. The nonspecializing countries either limit or eliminate entirely the production of those goods they import from the specializing country. Nonspecializing countries may also cooperate in the production of specialized goods by contributing component parts or technical assistance.

Production specialization is expected to achieve three major goals: (1) to increase production efficiency by lowering production costs, increasing output, and improving quality; (2) to equalize the levels of industrialization among the CEMA countries; and (3) to expand overall production capacity by facilitating an increase in exported goods. The underlying concept is that specialization promotes efficiency by eliminating duplication, thereby increasing economies of scale and concentrating and shortening development efforts.³ As the division of production becomes more extensive, each country will become increasingly

¹Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and the German Democratic Republic (GDR). In this Note, these countries, together with the Soviet Union, are referred to as "CEMA countries."
³Ibid., p. 11.
dependent on the other CEMA members to fulfill overall demand, until the community ultimately functions as an integrated system.

The main instruments for pursuing specialization and cooperation are treaties called "specialization and cooperation agreements." These agreements are based on recommendations made by CEMA organs or resolutions passed by bilateral intergovernmental commissions that specify who is to produce what products within a particular industry.

Specialization and cooperation agreements are only two types of a larger set of treaties for directing trade and anticipating future demand and supply requirements. These agreements differ from annual trade plans and five-year trade agreements in that they create a policy framework for economic relations under which trade in a particular industry is to be conducted.

The actual text of specialization and cooperation agreements is confidential (the original text may not be published in the West). General descriptions of the agreements do appear, however, in the literature. For instance, S. Chenchikovsky, the Deputy Chief of the Department of Cooperation with CEMA Member Countries in the Ministry of Foreign Trade of the USSR, defines the terms and conditions of 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.⁴

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⁴Vladimir Sobell, Radio Free Europe, personal communication; discussions with East European economists.
⁵S. Chenchikovsky, "Specialisation and Cooperation of Production in the CEMA Member Countries," Foreign Trade (Moscow), No. 7, 1975, pp. 24-28.
Western analysts note that the fundamental characteristic of a specialization agreement is the specification of the composition and direction of trade linkages among the CEMA members. The agreements list commodities to be exchanged, without stating detailed trade arrangements.⁶

Cooperation agreements, on the other hand, split up component production and sometimes provide for joint technological research and development. Cooperation agreements are linked to specialization agreements in that the specializing country will often involve its partners in the production of subassemblies and parts for the end product. Sobell (1984) summarizes the conceptual differences between specialization and cooperation: "Specialization is a measure of the vertical impact of integration decisions while co-operation denotes the deepening of the horizontal ties."⁷

Both specialization and cooperation agreements are considered to be essential for achieving the CEMA goal of "leveling-up" the economic development of its member countries.⁸ Specialization allows the countries to develop production efficiency in certain types of products; the cooperation aspect fosters the sharing of technologies, training, and experience.

RESEARCH APPROACH

This Note is a case study of specialization and cooperation agreements in the motor vehicle industry in CEMA. The two types of agreements are covered together because they are so difficult to differentiate. The motor vehicle industry was chosen for analysis because the number of specialization and cooperation agreements in this industry is high relative to other industries, and accounts of the

⁷Ibid., p. 13.
agreements are readily available in the trade literature. This industry is one of the most important industrial sectors in CEMA, accounting for 5.6 percent of gross industrial output in Hungary in 1985, and 3.3 percent in Poland. In the case of Hungary, this sector accounts for nearly 40 percent of its exports falling under specialization agreements. Moreover, one of the most successful examples of CEMA specialization, Hungarian bus production, is in this industry. The time frame for analysis in this sector is longer than that of many other sectors. CEMA specialization in motor vehicles was introduced in 1959 and specialization agreements have been in effect since 1968. Ostensibly, the development of the motor vehicle industry has been influenced by specialization and cooperation agreements for at least 20 years.

The purpose of this Note is to discover (1) the substantive form of the agreements, (2) how the agreements are drafted and implemented, and (3) whether they have been effective in increasing production, economic integration, and technological progress. These topics are presented in Sections II, III, and IV, respectively. The structure and national capabilities of the CEMA motor vehicle industry are described in Appendix A.

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9Statistical yearbooks; Czechoslovakia and the GDR do not give separate breakdowns for the motor vehicle industry, but figures would probably be of the same order of magnitude.  
II. SPECIALIZATION AND COOPERATION AGREEMENTS
IN THE MOTOR VEHICLE INDUSTRY

Specialization and cooperation agreements in the motor vehicle industry provide the framework for a diverse system of trade in parts, components, and finished vehicles. This section examines the extent to which the agreements direct the course of motor vehicle trade, addressing in particular the following questions:

- What motor vehicle products are included under the agreements?
- What are the terms of the agreements (i.e., reciprocal exchanges, duration)?
- Which countries participate the most frequently?
- Have these frequencies changed during the two decades since the introduction of the agreements?

DATA

Information on specialization and cooperation agreements was obtained from newspapers and from trade journals published by the CEMA countries. We believe that we have identified almost all of the existing agreements for specialization and cooperation in the motor vehicle industry.¹ Appendix B presents a list of the countries and products covered under specialization agreements. These agreements are typically renewed and sometimes changed every 10 to 20 years. We were not always able to discern whether an announcement of an agreement in the literature actually indicated adoption of a new agreement or simply continuation of a previously existing one. For this reason, and because

¹The sources included the CEMA journal Ekonomicheskoe Sotrudnichestvo Stran-Chlenov SEV, clippings from the U.S. Joint Publications Research Service, and the foreign trade journals Foreign Trade (Moscow), Handel Zagraniczny, Hungarian Foreign Trade, Czechoslovak Foreign Trade, and Romanian Foreign Trade. Collection of agreements on motor vehicles was part of a larger effort to identify specialization and cooperation agreements across all industries within CEMA.
the titles of the agreements are frequently not published, we do not include a list of the agreements themselves in this study.²

PATTERNS IN SPECIALIZATION AND COOPERATION AGREEMENTS

In our search, we found more than 60 bilateral agreements in the CEMA motor vehicle industry. Multilateral specialization and cooperation agreements are concluded much less often than bilateral agreements. Our data suggest that at least 9 multilateral agreements have been concluded for the exchange of motor vehicle products.

Motor Vehicle Products

The Soviet and East European literature indicates that specialization and cooperation have been most successful in bus production.³ It might be supposed, therefore, that more specialization and cooperation agreements (at least bilateral agreements) would be signed for the production of buses than for other motor vehicle products. However, our data do not support this conclusion. We found the following proportions of specialization and cooperation agreements for each type of motor vehicle: trucks, 28 percent; automobiles, 34 percent; buses, 15 percent; components and special vehicles, 22 percent. Agreements for the production of trucks and automobiles constitute the majority.

These results suggest that more specialization and cooperation agreements are signed when countries maintain their ability to produce a variety of motor vehicle products, rather than relinquishing production to "an assigned specializing country." For instance, Bulgaria is producing its own Setra bus in addition to importing from Hungary.

²RAND has compiled a computerized database containing over 2,000 entries describing specialization and cooperation agreements and a hardcopy directory that organizes these entries by industry. A detailed description of the results of that survey is presented in Keith Crane and Deborah Skoller, Specialization Agreements in the Council for Mutual Economic Cooperation, The RAND Corporation, R-3518, February 1988.
Bulgaria not only has a specialization and cooperation agreement with Hungary, but also has cooperation agreements with Poland and Romania for the manufacture of separate buses.

This observation is supported by the diversity of agreements concluded by each country. Table 1 shows the proportion of bilateral agreements that cover various motor vehicle products for each CEMA country. With the exception of Romania, each of the CEMA countries has specialization and cooperation agreements for cars, trucks, and buses. The majority of Hungary's agreements, however, cover buses, while Czechoslovakia and Poland participate most frequently in agreements covering cars and trucks. The most numerous Soviet agreements are those covering automobile production.

Multilateral agreements serve as umbrellas under which bilateral agreements are signed; each multilateral agreement appears to involve nearly all the CEMA countries. Nevertheless, some patterns can be observed. Bulgaria's multilateral agreements are primarily in truck and

Table 1

<table>
<thead>
<tr>
<th>Participating Country</th>
<th>Product Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autos</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>39</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>27</td>
</tr>
<tr>
<td>GDR</td>
<td>25</td>
</tr>
<tr>
<td>Hungary</td>
<td>20</td>
</tr>
<tr>
<td>Poland</td>
<td>32</td>
</tr>
<tr>
<td>Romania</td>
<td>0</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>45</td>
</tr>
</tbody>
</table>

SOURCE: RAND database of on specialization and cooperation agreements.

aThis category covers specialized motor vehicles, trailers, and parts, when the finished vehicle for which they are destined is not specified.
automobile production, while the GDR has multilateral agreements in truck, automobile, and machine tool production for the motor vehicle industry. Romania apparently does not participate in any multilateral programs for motor vehicles, but it does export diesel engines to several countries for use in the manufacture of heavy vehicles produced under multilateral specialization agreements (see Appendix B).

Pecsi has suggested that specialization predominates in finished vehicles and is less widespread in parts and components. However, CEMA recognizes the importance of guaranteeing component deliveries as a necessary requisite for increasing the efficiency of motor vehicle production. For instance, in 1976, a multilateral specialization agreement was concluded among Hungary, Czechoslovakia, Bulgaria, and Poland for the production of diesel engines, automatic and hydraulic gearboxes, rear- and front-axle subassemblies, and brake sets. Under this agreement, Czechoslovakia is to specialize in the manufacture of several types of diesel engines and gearboxes; Hungary, in rear and front axles, engines, and hydraulic equipment; Bulgaria, in rear subassemblies; and Poland, in brake equipment.

Implementation of these agreements seems to have been emphasized in the 1980s. Further development and refinement of the 1976 multilateral agreement now occurs under the "Program for the Creation of Progressive Diesel Engines for Trucks," established in 1981. The development of diesel engines is one of the recent areas of focus in the CEMA motor vehicle industry. Although such engines are still produced in a number of CEMA countries, Czechoslovakia is concentrating on developing the capability to produce diesel engines for trucks and cars. Czechoslovakia has been assigned the majority of the tasks under this

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*Sobell, 1984, p. 178.
*Shastitko, 1985, pp. 158-159.
new development program and, as a result, may become the leading producer of diesel engines for CEMA.

Frequency of Participation

Since production capabilities are so different among the CEMA countries, it might be supposed that some governments participate more frequently than others in specialization and cooperation agreements. A corollary to this hypothesis is that as the CEMA motor vehicle industries have developed, these frequencies may have changed over time. Table 2 shows the frequency of participation in bilateral specialization and cooperation agreements, by country. The most frequent participants in bilateral agreements are currently Hungary, the Soviet Union, Czechoslovakia, and Poland; these countries have accounted for the largest share of specialization and cooperation agreements since the early 1970s. These same four countries are the most frequent participants in multilateral agreements as well.  

The frequency with which one country concludes agreements with other countries may reflect national strategies to satisfy demand for motor vehicles. For example, the Soviet Union has by far the largest domestic motor vehicle market and industry in CEMA. Is the Soviet Union, therefore, the focal point of most specialization agreements? The GDR has given up domestic production of buses for Hungarian imports. Does the GDR then have more agreements with Hungary than with other CEMA countries? Hungary has forsworn the development of a domestic automobile industry. Does Hungary therefore conclude most of its specialization agreements with major CEMA producers of automobiles?  

Based on the information in Table 2, Table 3 shows that the Soviet Union participates in 39 percent of all the bilateral agreements in the

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There is a potential bias in our data because we were unable to obtain a foreign trade journal published by the GDR. This bias could render information for the GDR less comprehensive than that for the other CEMA countries. Nevertheless, since agreements are always between two or more countries, they should be mentioned in the partner country's trade papers. Therefore, we believe that our estimates probably cover almost all the specialization agreements in which the GDR participates.
Table 2

FREQUENCY OF PARTICIPATION IN BILATERAL SPECIALIZATION AND COOPERATION AGREEMENTS IN THE CEMA MOTOR VEHICLE INDUSTRY

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>GDR</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Hungary</td>
<td>5</td>
<td>13</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>Poland</td>
<td>3</td>
<td>13</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Romania</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>9</td>
<td>12</td>
<td>17</td>
<td>23</td>
</tr>
</tbody>
</table>

*Numbers are cumulative across years, based on the assumption that all specialization agreements signed have remained in force. Extensions of previous agreements were not counted as new agreements.

Table 3

FREQUENCY OF JOINT AGREEMENTS FOR BILATERAL SPECIALIZATION AND COOPERATION IN THE MOTOR VEHICLE INDUSTRY

<table>
<thead>
<tr>
<th>Country</th>
<th>Czechoslovakia</th>
<th>GDR</th>
<th>Hungary</th>
<th>Poland</th>
<th>Romania</th>
<th>USSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>6</td>
<td>--</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>--</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>GDR</td>
<td>--</td>
<td>4</td>
<td>2</td>
<td>--</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hungary</td>
<td>--</td>
<td></td>
<td>8</td>
<td>--</td>
<td>--</td>
<td>6</td>
</tr>
<tr>
<td>Poland</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>6</td>
</tr>
<tr>
<td>Romania</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1</td>
</tr>
</tbody>
</table>
motor vehicle industry. The Soviet Union has maintained a large number of agreements with all the CEMA countries except the GDR and Romania. Soviet participation was more than double what would be expected (one-seventh, or 14 percent) if each country participated in equal measure in specialization agreements. Thus, the Soviet Union seems to be a focal point in motor vehicle specialization and cooperation agreements.

Table 3 shows that the bulk of Hungary's agreements with countries other than the Soviet Union are with Poland and Czechoslovakia, and that the GDR has concluded a large share of its agreements with Hungary. These results support the hypothesis that if a country has not developed its production capabilities for a particular motor vehicle, it will participate largely in agreements with countries that have well developed production capabilities for that vehicle.

However, the number of specialization agreements between two countries may not indicate the value of those agreements. Although Poland has more agreements with Hungary than with the Soviet Union, Polish agreements with the latter may be much more important by value. Table 4 presents the current-year value of motor vehicle exports to selected individual countries, in dollar amounts. These data should be regarded with some caution, since the currency value was converted from transferable rubles. Nevertheless, it is possible to compare the relative worth of the transfers between countries in a given year.

Assuming that all motor vehicle products are covered under specialization and cooperation agreements for Hungary, Czechoslovakia, and the GDR, it is apparent that the agreements are not of similar value, as shown in Table 4. Although Czechoslovakia and Hungary have more agreements with Bulgaria and Poland, respectively, than with the Soviet Union, their exports to the Soviet Union during the 1980s were much more extensive. On the other hand, East Germany's four agreements

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10 This assumption may be slightly misleading for the GDR, since some of its trucks are not exported under a specialization agreement. The export of virtually all Czechoslovak and Hungarian motor vehicles, however, falls under one or more specialization agreements. Romanian and Polish exports are not examined in Table 4 because most Romanian motor vehicle products and Polish trucks are not covered by a specialization agreement.
Table 4  
VALUE OF MOTOR VEHICLE EXPORTS AMONG CEMA COUNTRIES  
($ millions)  

<table>
<thead>
<tr>
<th>Year</th>
<th>Czechoslovakian Exports to Bulgaria</th>
<th>Hungarian Exports to USSR</th>
<th>GDR Exports to Hungary</th>
<th>GDR Exports to USSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>15.3 a</td>
<td>9.9</td>
<td>30.8</td>
<td>3.6</td>
</tr>
<tr>
<td>1968</td>
<td>n.a.</td>
<td>9.4</td>
<td>26.2</td>
<td>1.5</td>
</tr>
<tr>
<td>1969</td>
<td>16.6</td>
<td>11.2</td>
<td>24.0</td>
<td>1.7</td>
</tr>
<tr>
<td>1970</td>
<td>17.0</td>
<td>15.8</td>
<td>47.8</td>
<td>1.7</td>
</tr>
<tr>
<td>1971</td>
<td>21.6</td>
<td>19.6</td>
<td>58.6</td>
<td>20.2</td>
</tr>
<tr>
<td>1972</td>
<td>31.2</td>
<td>22.5</td>
<td>53.8</td>
<td>41.7</td>
</tr>
<tr>
<td>1973</td>
<td>n.a.</td>
<td>28.5</td>
<td>60.6</td>
<td>44.5</td>
</tr>
<tr>
<td>1974</td>
<td>n.a.</td>
<td>27.4</td>
<td>102.2</td>
<td>25.3</td>
</tr>
<tr>
<td>1975</td>
<td>41.1</td>
<td>35.2</td>
<td>131.5</td>
<td>18.2</td>
</tr>
<tr>
<td>1976</td>
<td>66.5</td>
<td>228.1</td>
<td>161.3</td>
<td>27.0</td>
</tr>
<tr>
<td>1977</td>
<td>71.2</td>
<td>n.a.</td>
<td>161.3</td>
<td>n.a.</td>
</tr>
<tr>
<td>1978</td>
<td>73.2</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>1979</td>
<td>81.2</td>
<td>63.8</td>
<td>224.2</td>
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<tr>
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<td>59.8</td>
<td>250.2</td>
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<tr>
<td>1982</td>
<td>88.0</td>
<td>83.4</td>
<td>256.9</td>
<td>125.5</td>
</tr>
<tr>
<td>1983</td>
<td>91.5</td>
<td>92.4</td>
<td>279.8</td>
<td>187.2</td>
</tr>
</tbody>
</table>


aNumbers are current-year dollar values converted from transferable ruble amounts of total motor vehicle exports.

with Hungary were much more valuable than its two agreements with the Soviet Union during the 1980s. Nonetheless, in value terms, the Soviet Union appears to be the focal point for motor vehicle trade falling under specialization agreements.

Despite agreements on automobiles with Czechoslovakia, the GDR, and Poland, the Soviet Union appears to concentrate its exports to countries without automobile industries or with small automobile industries (see Table 5). In 1983, Bulgaria and Hungary each received more than a quarter of the Soviet Union's total automobile exports to Eastern Europe. Soviet automobile exports to Poland increased in 1980, at the
time of Poland's economic crisis. Over time, Bulgaria has received the greatest percentage of Soviet motor vehicle exports to Eastern Europe, even though its economy is very small (see Table 6). These data indicate that the major manufacturers of motor vehicles, e.g., Czechoslovakia and Poland, have remained relatively self-sufficient.

Terms of the Agreements

Virtually all of the specialization agreements in the motor vehicle industry include the exchange of finished and intermediate motor vehicle products. Moreover, the agreements do not cross sectors—that is, motor vehicle products are always exchanged for other products of the motor vehicle industry. For example, cars are exchanged for buses, trucks, motor vehicle components, or other cars, not for chemicals or canned fruit. Motor vehicle agreements typically do not involve the exchange

Table 5

<table>
<thead>
<tr>
<th>Year</th>
<th>Bulgaria</th>
<th>Hungary</th>
<th>GDR</th>
<th>Poland</th>
<th>Romania</th>
<th>Czechoslovakia</th>
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</thead>
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<td>6.7</td>
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<td>40.3</td>
<td>6.0</td>
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<tr>
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<td>6.3</td>
<td>7.3</td>
<td>18.7</td>
</tr>
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<td>3.8</td>
<td>0.7</td>
<td>21.2</td>
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<td>3.9</td>
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<td>21.7</td>
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<td>28.1</td>
<td>7.6</td>
<td>0.9</td>
<td>21.8</td>
</tr>
<tr>
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<td>24.3</td>
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<td>25.8</td>
<td>6.9</td>
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<td>20.8</td>
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<td>9.0</td>
<td>8.7</td>
<td>0.0</td>
<td>12.1</td>
</tr>
</tbody>
</table>

SOURCE: Statistical yearbooks (see Table C.1 in Appendix C).
### Table 6

SHARE OF TOTAL SOVIET MOTOR VEHICLE EXPORTS TO CEMA, BY COUNTRY

(Percent)

<table>
<thead>
<tr>
<th>Year</th>
<th>Bulgaria</th>
<th>Czechoslovakia</th>
<th>GDR</th>
<th>Hungary</th>
<th>Poland</th>
<th>Romania</th>
<th>Total</th>
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</thead>
<tbody>
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<td>1967</td>
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<td>7.3</td>
<td>23.8</td>
<td>14.8</td>
<td>16.7</td>
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<td>9.8</td>
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<td>12.6</td>
<td>5.2</td>
<td>100.0</td>
</tr>
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<td>10.0</td>
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<td>11.2</td>
<td>15.5</td>
<td>4.2</td>
<td>100.0</td>
</tr>
<tr>
<td>1970</td>
<td>24.9</td>
<td>8.5</td>
<td>29.4</td>
<td>17.9</td>
<td>14.2</td>
<td>5.1</td>
<td>100.0</td>
</tr>
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<td>21.5</td>
<td>19.1</td>
<td>10.2</td>
<td>2.8</td>
<td>100.0</td>
</tr>
<tr>
<td>1972</td>
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<td>14.4</td>
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<td>10.2</td>
<td>2.1</td>
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<tr>
<td>1973</td>
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<td>1.2</td>
<td>100.0</td>
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<tr>
<td>1974</td>
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<tr>
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<tr>
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<td>14.6</td>
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<td>1977</td>
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<tr>
<td>1978</td>
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<td>1979</td>
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<td>9.0</td>
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<td>19.1</td>
<td>25.9</td>
<td>5.1</td>
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<td>n.a.</td>
<td>n.a.</td>
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<td>n.a.</td>
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<tr>
<td>1983</td>
<td>28.0</td>
<td>10.5</td>
<td>14.6</td>
<td>27.0</td>
<td>15.5</td>
<td>4.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Numbers are calculated from current-year dollar values converted from transferable ruble values for total motor vehicle exports.

of raw materials used in the industry, such as metals for motor vehicle products.

Under specialization agreements in the motor vehicle industry, combinations of finished vehicles and components are traded among the CEMA countries. As a result, specialized production is not limited to finished industrial goods; subassemblies and components are also exchanged on the basis of specialization and cooperation agreements.

An examination of the reports about trade relations established under CEMA specialization reveals that all types of exchanges are covered by specialization and cooperation agreements:
- 15 -

- Fully assembled vehicles are exchanged for components or sub-assemblies of the same vehicle.
- Fully assembled vehicles are exchanged for parts or sub-assemblies of different types of vehicles—buses, trucks, and passenger cars.
- Assemblies, subassemblies, or parts for one vehicle are exchanged for assemblies, subassemblies, or parts for other vehicles.
- Fully assembled vehicles of one type are exchanged for fully assembled vehicles of other types.

A specific example of the first type of trade, vehicles for constituent parts, is the 1973 agreement between Hungary and Poland for the production of the Fiat 126p. Hungary supplies Poland with dashboards, complete piston sets, ignition distributors, voltage regulators, horns, windshield wipers, and speedometers for the Fiat 126p, and in exchange, Poland exports to Hungary fully assembled 126p automobiles.\textsuperscript{11}

The second type of exchange, vehicles for parts of other vehicles, is exemplified by an agreement between Czechoslovakia and Hungary. Czechoslovakia exports to Hungary Skoda, Tatra, and Avia motor vehicles. In exchange, Hungary supplies Czechoslovakia with gears for transmissions for LiAZ trucks, buses, trolleybuses, and reapers, and other bus and automobile components.\textsuperscript{12}

An example of trade in parts for parts is the exchange between Hungary and the GDR in which Hungary exports a variety of electrical fittings and transmission shafts for agricultural equipment. In return, Hungary receives from the GDR transmissions shafts, drivers' seats, and heating systems for buses.\textsuperscript{13}

\textsuperscript{11}Sobell, 1984, pp. 173-182.
\textsuperscript{12}Revue Obchodu, September 1982, cited in Defense Intelligence Agency, 
\textit{Warsaw Pact Economic Integration}, March 1985, p. 56.
The fourth type of exchange, trade in fully assembled vehicles, is commonly specified in multilateral agreements. An example of this type of exchange occurs in a multilateral specialization agreement among the USSR, the GDR, Hungary, and Czechoslovakia. Under this agreement, the GDR exports the IFA W 50 truck to the USSR, Hungary, and Czechoslovakia. In exchange, the GDR receives heavy trucks, the KamAZ and BelAZ, from the USSR; the Tatra truck from Czechoslovakia; and Ikarus buses from Hungary.¹

Transactions can combine goods produced under either specialization or cooperation. A transaction may involve the exchange of both specialized products and components manufactured under a cooperation agreement. For example, Hungary specializes in the production of buses but cooperates in the production of automobiles with the Soviet Union. Hungary exports to the Soviet Union both articulated buses and components for Lada cars (i.e., dashboards, gearboxes, locks, transistors, and headlights). In return, Hungary receives complete Lada automobiles.¹

The duration of specialization agreements in the motor vehicle industry is typically 10 to 20 years. For instance, in 1981, Bulgaria and Czechoslovakia signed a bilateral agreement covering mutual deliveries of trucks until the year 2000.¹

Many of the agreements signed following the Complex Program (adopted in 1971) are still in force or have been extended for another period. Thus, it is not surprising that the countries that participate most intensively are the same and that their specialization strategies have remained unchanged since the early 1970s. This stability may also be due to the fact that in some of these countries, such as

Czechoslovakia and Hungary, factories became specialized by end-products after World War II.17 The manufacture of cars, buses, and trucks began to separate early, facilitating the introduction of specialization agreements in this industry and encouraging their continued application. In 1970, Czechoslovakia and the GDR were the leading producers of cars in Eastern Europe, while Hungary and Poland were the leading producers of buses, and Czechoslovakia, the GDR, Poland, and Romania were the leading producers of trucks (see Tables C.1, C.2, and C.3). Today, Czechoslovakia and Poland are still the leading producers of trucks in Eastern Europe. Czechoslovakia and the GDR have been surpassed by Poland in the production of cars, and Hungary has become the largest producer of buses.

III. MECHANISMS FOR DEVELOPING SPECIALIZATION AND COOPERATION AGREEMENTS

On what basis are specialization and cooperation agreements formulated? It appears that the development of the motor vehicle industry in each country has been dictated by national investment plans and postwar endowments. This hypothesis is supported by production trends in motor vehicles (Appendix C), which indicate that some of the agreements were directed at strengthening, rather than diminishing, existing industries (e.g., the Polish production of Jelcz buses). In general, national roles in the overall scheme of CEMA motor vehicle production have paralleled the previously established or developing national capabilities described in Appendix A. For instance, Bulgarian planners placed initial emphasis on the development of the electrotechnical and electromechanical industries, including forklifts. CEMA specialization programs in electric forklifts have enabled Bulgaria to concentrate on developing a comparative advantage in this product.

The coordination of CEMA production strategies is a lengthy process involving inputs from a variety of economic and planning organizations. The channels through which official policies are made are established by the central authorities of each country and conform to the national hierarchical structure of industrial management. This section (1) describes the general structure of the bureaucratic apparatus for decisionmaking and administration in Soviet-type economies, (2) identifies the actors involved in developing specialization and cooperation agreements in the motor vehicle industry, and (3) examines their roles in this process.

THE STRUCTURE OF CENTRAL ECONOMIC DECISIONMAKING

Industrial decisionmaking in Soviet-type economies is organized as a multilevel hierarchy consisting of, in descending order, the central authorities, the branch ministries, an intermediate administrative unit (a collective, usually called an association, trust, or combine), and
the enterprises (the production units). This structure is similar for all the East European CEMA countries except Hungary, where the association level has been eliminated.

Policymaking power rests with the central authorities—the central government, i.e., the Politburo (or Presidium), the Central Committee and its Secretariat, and the Council of Ministers; and the functional and branch units, i.e., the State Planning Commission, the Finance Ministry, the central bank, the branch ministries, and the Ministry of Foreign Trade. These institutions are responsible for major economic policy decisions. In general, the central government focuses on setting goals and developing strategies, while the functional units translate these goals into more specific policies as a first step in their implementation.

This division of functional roles, however, often becomes blurred during the process of decisionmaking. For instance, in the Soviet Union, the Politburo must deal with implementation to provide a realistic foundation for policy and to make policy relevant. The Politburo also becomes involved in the petty details of implementation in order to maintain adherence to its policies.

The central administrative organ for control and guidance of foreign trade is the Ministry of Foreign Trade. The structure and function of this ministry in each of the CEMA countries is basically the same. According to research conducted by the United Nations:

Each Ministry of Foreign Trade elaborates the fundamentals of national trade policy, works out foreign trade plans and supervises their implementation, conducts intergovernmental negotiations to conclude agreements and treaties and exercises control over their implementation, and makes recommendations concerning the maintenance and expansion of trade relations with particular countries. The Ministry of Foreign Trade

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ensures that all foreign trade institutions in the country adhere to the national policy of the State. International agreements on specialization and co-operation in production . . . may be concluded by other ministries . . . with the approval of the Ministry of Foreign Trade. 3

Centralization in foreign trade management has been relaxed in some of the CEMA countries during the last decade. Ministries of Foreign Trade now often allow foreign trade organizations (FTOs) more flexibility in the fulfillment of plans and more independence in decisionmaking. In many countries, including the GDR, Hungary, Poland, and the Soviet Union, some FTOs are closely linked to motor vehicle producers.

The planning and control of foreign trade in the CEMA countries shows how strategy-setting and implementation are interrelated. In general, the Planning Commission drafts the national annual and five-year plans, including the foreign trade plans. These plans are sent to the branch ministries and the Ministry of Foreign Trade, where they are elaborated and passed on to the collectives, enterprises, and foreign trade corporations. The enterprises estimate their production requirements and return the plans back through the hierarchy to the Planning Commission, which then revises the draft plan. 4

THE ROLE OF THE CEMA ORGANS

Since specialization and cooperation agreements ratify CEMA-wide production strategies, it might be supposed that their development would be carried out mainly at the upper administrative levels. This, in fact, tends to be the case, primarily in the development of multilateral agreements, which require a greater degree of international plan coordination than bilateral agreements.

Multilateral agreements on specialization and cooperation production, including motor vehicle production, are concluded in the organs of CEMA.5 These agreements are developed mainly through the acceptance of recommendations made, in particular, by the Standing Commissions.6 The content of the agreements is prepared and agreed on in the course of evaluating and negotiating the recommendations presented by the Standing Commissions.7

The motor vehicle industry has been under the purview of the Standing Commission for Machine Building, created in 1956. This Standing Commission was upgraded to Council Committee status in 1985 and was renamed the Council Committee for Cooperation in Machine Building.8

In the early 1970s, the Standing Commission for Machine Building turned its attention to specialization in the production of components and servicing equipment. The Standing Commission set up working groups to explore this issue.9 Subsequent multilateral agreements, such as the agreement among Hungary, Czechoslovakia, Bulgaria, and Poland for component production, were based on the findings of such working groups.

THE ROLE OF THE NATIONAL DECISIONMAKING AGENCIES

The responsibility for drafting bilateral agreements on production specialization and cooperation tends to rest with the individual states. These agreements are sometimes developed within the framework of multilateral agreements at the level of the sectoral ministry.10

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7Shiryaev, 1981.
contacts between ministries occur through intergovernmental commissions (or committees) on economic, scientific, and technical cooperation. These are bilateral, consisting of two parts corresponding to the two nations, each part headed by a chairman. They are made up of various representatives from the central authorities, ministries, and specialists of each country. Their auxiliary organs consist of subcommissions, task forces, and other organizations. The bilateral intergovernmental commissions have a wide range of competence in the realm of production cooperation, trade, and scientific and technical cooperation. Bilateral agreements are concluded according to the decisions of these intergovernmental commissions.\footnote{Chenchikovsky, 1975; Shiryaev, 1981.}

The drafting of bilateral agreements occurs in the course of coordinating national economic plans. The agreements usually establish commodity deliveries for the long term but are too general to provide details of the technological factors involved in production, nor are they amended when market demands change.\footnote{Bauer and Soos, 1979, p. 292.}

This process was demonstrated in the motor vehicle industry by a meeting of the Czechoslovak-Hungarian Intergovernmental Committees on Economic, Scientific, and Technical Cooperation. On December 20, 1976, the Chairmen of the two national sections of the committee--Czechoslovak Deputy Premier R. Rohlicek and Deputy Chairman of the Hungarian Council of Ministers Gyula Szeker--signed a bilateral agreement on cooperation in the manufacture of spare parts and finished products for the automobile industry. They also discussed other possibilities for cooperation in engineering.\footnote{"Chronicle," \textit{Czechoslovak Foreign Trade}, Vol. 17, No. 4, 1977, p. 2.}

Contacts also occur at the level of the combine or association, but these consist mainly of advisory and coordinating activities, not decisionmaking. For example, the IFA truck combine of the GDR is involved in joint working groups with other CEMA countries for the
purposes of coordinating production under specialization and cooperation.\textsuperscript{14}

THE ROLE OF THE INDUSTRIAL ENTERPRISE

In 1981, at the 35th Meeting of the CEMA Council Session, the state delegations advocated the extensive development of direct ties among ministries, economic organizations, and enterprises.\textsuperscript{15} 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."\textsuperscript{16} 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 independently make decisions on the conclusion of short-term economic contracts. Enterprises are permitted to correspond only with other national enterprises, however, on scientific and technical questions not connected with commercial conditions of operation.\textsuperscript{17}

This decentralizing policy, which appears to have been initiated by the Soviet Union, augments the relative strength of the branch ministries in managing international cooperation and co-production. The decisionmaking rights of the enterprises are still dependent on approval.

\textsuperscript{14}Heinzmann, 1984, p. 59.


\textsuperscript{16}Maria Bogatska, "International Specialization and Cooperation of Production: Poland-USSR," \textit{Ekonomichesko Sotrudnichestvo Stran-Chlenov SEV}, No. 9, 1985, pp. 31-34.

\textsuperscript{17}O. Bakovetskiy and V. Grinev, "On Direct Production Ties," \textit{Voprosy Ekonomiki}, No. 4, 1982, pp. 113-121.
by the ministry. In Hungary, such a system has existed since the mid-
1970s. According to Bauer and Soos (1979), the ministry can give
preference to maintaining the monopoly supplier specified by the
cooperation agreement, rather than approving transfer of the deliveries
to another foreign or even a domestic supplier. For instance, in
Hungary, the ministry vetoed the decision to use a domestic supplier for
windshield-wiper motors rather than the original Polish supplier, even
though the domestic motors were more up-to-date.\(^\text{18}\)

This delineation of power suggests that direct contacts between
enterprises reported in the East European and Soviet press have been
superficial. The agreements appear to have been limited to very large
enterprises or conglomerates, organizations with a great deal of power
in the bureaucracy.

Whether motor vehicle enterprises actually have been given latitude
for independently negotiating cooperation agreements remains to be seen.
Some reports indicate that international contacts between cooperating
enterprises in the motor vehicle industry have been limited to the
exchange of research information.\(^\text{19}\)

An example of direct enterprise contacts in research and
development of motor vehicles is the "long-term" cooperation between the
Soviet research institute NAMI and the GDR motor vehicle factory in
Ludwigsfelde. In this association, lengthy experiments are being
conducted on the reliability of the IFA W 50 truck at cold temperatures.
Likewise, the Hungarian AUTOKUT institute is assisting in the
development of a new motor for the W 50 that improves performance in
terms of noise in the exhaust system, fuel demands, and the reliability
of spark suppression. This new motor will be incorporated into the W 50
in the GDR production lines.\(^\text{20}\)

\(^\text{18}\)Bauer and Soos, 1979, p. 296.
\(^\text{19}\)Ivan Schwietzer, "Order of Magnitude and Market Behavior of the
21-34.
\(^\text{20}\)Heinzmann, 1984, pp. 57-61.
The new Soviet economic experiment designed to promote enterprise independence could provide Soviet enterprises some leverage for direct contacts. The Soviet VAZ plant has been included in this experiment, and it elaborates its new administrative rights as follows:

The expansion of the association's rights is one of the main conditions of the experiment at the Volga Automotive Plant. In the new five-year plan, AvtoVAZ will receive rights that we could only dream about before. The main one of these is the collective's right to plan its own activity and to report on its work according to a limited number of indices. We intend to invest large sums in the intensive development of machine-tool construction. We will make our own decisions on this matter--on the basis of direct contacts.21

These planning rights are too vaguely articulated, however, to determine whether enterprise autonomy in the motor vehicle industry will extend to the right to sign international production agreements without the previous approval of the branch and foreign trade ministries. On the contrary, it is more likely that the planning of specialization and cooperation will, for all intents and purposes, remain within these agencies.

In a number of the CEMA countries, rapid reforms in the bureaucratic procedures for decisionmaking may change the way in which specialization and cooperation agreements are planned and implemented. At present, it is too early to discern what, if any, impacts these reforms might have on the future effectiveness of specialization and cooperation agreements in the motor vehicle industry.

IV. ASSESSMENT OF SPECIALIZATION AND COOPERATION AGREEMENTS IN THE MOTOR VEHICLE INDUSTRY: HAVE THEY BEEN EFFECTIVE?

This section assesses the effectiveness of specialization and cooperation agreements in achieving the goals described in Section I. To what extent have these goals been met in the motor vehicle industry? In particular, have the agreements led to increased motor vehicle production, greater economic integration, expanded trade in components, and higher technological levels?

MOTOR VEHICLE PRODUCTION

Concentrating industrial production of a specified product line in one country theoretically paves the way for the expansion of serial production. Table 7 summarizes the production of motor vehicles in the CEMA countries since the adoption of specialization and cooperation agreements (this table is based on Tables C.1, C.2, and C.3 in Appendix C). Absolute production figures show that in 1984, Hungary was second only to the Soviet Union in bus production, followed by Poland. However, only the GDR had reduced its bus production to very low levels. Bus production grew in Bulgaria, but the absolute number of buses produced remained small.

Another example shows that truck production has increased somewhat faster in the specializing countries. In Czechoslovakia, which specializes in producing 12- and 14-ton trucks, truck production increased by 92 percent in 1984, as compared with 1970 levels. Truck production also increased in the GDR, which specializes in producing the 5-ton W 50 truck under a multilateral agreement, by 78 percent. Unfortunately, data for Soviet truck production are not available (the Soviet Union specializes in the production of 6- and 27-ton trucks).

Increased production of specialized goods is frequently precluded by demand and supply constraints, poor planning during agreement development, and insufficient raw materials. Most of the CEMA countries
### Table 7

PRODUCTION OF CARS, TRUCKS, AND BUSES BY CEMA COUNTRIES IN 1970 AND 1984

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>7,800</td>
<td>15,000</td>
<td>2,532</td>
<td>n.a.</td>
<td>643</td>
<td>2,507</td>
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<tr>
<td>Czechoslovakia</td>
<td>142,858</td>
<td>180,150</td>
<td>24,462</td>
<td>46,872</td>
<td>2,602</td>
<td>3,204</td>
</tr>
<tr>
<td>GDR</td>
<td>128,611</td>
<td>202,000</td>
<td>24,180</td>
<td>43,105</td>
<td>2,587</td>
<td>1,691</td>
</tr>
<tr>
<td>Hungary</td>
<td>--</td>
<td>--</td>
<td>2,860</td>
<td>1,279</td>
<td>5,983</td>
<td>13,062</td>
</tr>
<tr>
<td>Poland</td>
<td>64,150</td>
<td>278,000</td>
<td>41,000</td>
<td>46,900</td>
<td>9,000</td>
<td>8,300</td>
</tr>
<tr>
<td>Romania</td>
<td>16,250</td>
<td>107,208</td>
<td>35,018</td>
<td>n.a.</td>
<td>2,073</td>
<td>n.a.</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>344,200</td>
<td>1,315,000</td>
<td>524,500</td>
<td>n.a.</td>
<td>47,400</td>
<td>81,100</td>
</tr>
</tbody>
</table>

**Sources:** Statistical yearbooks: (Hungary) Kuelkereskedelmi Statisztikai Evkoenyv; (Soviet Union) Narodnoe Khozyaistvo SSSR, Vneshniaia Torgovlia SSSR: statisticheskii sbornik; (GDR) Statistisches Jahrbuch der Deutschen Demokratischen Republik; (Czechoslovakia) Statisticka Rocenka Ceskoslovenske Socialisticke Republiky; (Poland) Rocznik Statystyczny; (Bulgaria) Statistiche Godishnik na Narodna Republika Bulgariya; (Romania) Anuarul Statistic al Republicii Socialiste Romania; various years.

Figures for the Soviet Union are for 1975 and 1983 because no 1984 information was available.

have strongly resisted the loss of their rights to continue to produce whatever types of motor vehicles they choose.¹

This national resistance is reflected in the apparent reluctance of some of the CEMA countries to become more dependent on foreign markets, including the markets of other CEMA countries. For example, the production of Hungarian automobile components (produced under a cooperation agreement) is hampered by the demand of its partner in the following way:

[Hungary repeatedly offered] to expand deliveries of automobile parts, partly with a view to a better utilization of the Hungarian facilities, and partly because there is in

the Hungarian market a keen demand for the vehicles obtained in exchange. The partner country [specific country not mentioned], however, responded by developing and maintaining its own production of the parts in question, at the cost of a sizeable investment. . . . The fact is, however, that the vehicles earmarked for sale in the West are invariably fitted with the Hungarian parts, whereas those fitted with domestic ones are retained for the home market.  

In this case, production is limited by the consumer.

Often, however, increases in production are frustrated by the suppliers' failure to deliver their committed goods on schedule in the promised condition. Delays in critical items lead to idle capacity, which lowers output. Sometimes (as in the case of Hungary), the CEMA recipient must replace the delayed items with costly purchases from the West.

The lack of effective cooperation not only lowers production volume, it can also lower the quality of the finished vehicle. For instance, in the Hungarian bus program, the GDR was originally to produce small buses and Hungary was to specialize in larger ones. The GDR reneged, however; consequently, the Ikarus bus factory has to produce smaller buses as well. In contrast to the main models, these smaller models are poorly designed and are based on a truck chassis, rather than one designed specifically for them. They are neither marketable in the West nor 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.  

Problems of component quality can also lower the quality of the entire product. This is again illustrated in the Hungarian bus industry. Hungarian manufacturers often have 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 willing to consider only a few adaptations necessary for bus axles, since the Ikarus contract is smaller.\textsuperscript{4} The result is uneven quality of the finished vehicle.

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 made in installing CEMA components. To sell their buses in the West, the Hungarians must produce special buses with parts and subassemblies either procured outside CEMA or produced under Western license in small batches.\textsuperscript{5}

The consumer can sometimes attempt to guarantee the quality of merchandise produced under specialization and cooperation agreements. For instance, in the Fiat 126p cooperation agreement between Poland and Hungary in which Hungary supplies parts in return for cars, Poland managed to get the Hungarians to accept the condition that any element failing to meet official certification requirements must be bought in the West.\textsuperscript{6}

Such supply constraints may result partly from the way in which specialization and cooperation agreements are designed. The agreements are sometimes concluded with a specific supplier in mind.\textsuperscript{7} State intervention can create a monopoly situation for the manufacturer which may remove the incentives to cooperate effectively. In some cases, the agreements will tend to lock the consumer into interactions with a state-specified supplier, even though the consumer's demands are not adequately met by that supplier. His only option is to continue to buy and complain.\textsuperscript{8}

Excessive bureaucracy in CEMA countries also contributes 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.\textsuperscript{9}

\textsuperscript{4}Ibid.
\textsuperscript{5}Bauer and Soos, 1979, p. 292.
\textsuperscript{6}Bogda Żukowska, "Cooperation Inside the CEMA Fails Expectations," \textit{Polityka Eksport Import,} No. 18, 1985.
\textsuperscript{7}Ibid.
\textsuperscript{8}Bauer and Soos, 1979, pp. 297-298.
\textsuperscript{9}Torok, 1986, p. 66
Poor planning during the development phase of the agreements also decreases the growth rate of production. In the motor vehicle industry, many specialization agreements suffer from poor technical and commercial preparation. Agreements have sometimes been signed by governments without taking into account the conditions and costs of production.\textsuperscript{11} This happened, for example, during the construction and equipping of the Madara truck plant in Bulgaria in accordance with a specialization and cooperation agreement between Bulgaria and Czechoslovakia. Envisaged production capacities could not be met, partly because the available machinery for building certain parts (gears for the Perkins diesel engine, radial gears for the Skoda rear axle) was more than 15 years old and had undergone two or more overhauls. This obsolete machinery was considered by Bulgaria to be incapable of meeting the technical demands of the new agreement.\textsuperscript{11}

Sometimes in these cases, the factory simply operates at a low level of production. In Poland, for instance, demands for Fiat 126p replacement parts are outdistancing production capabilities. However, growth in the production of spare parts is limited by a lack of funding for the purchase of machinery to increase production capacity.\textsuperscript{12}

Another obstacle to increasing the production of specialized products is the lack of hard currency to purchase needed raw materials from the West. For instance, in Poland's tire industry, a large proportion of the raw materials (e.g., raw rubber and steel cord) are imported from dollar-market countries. The production facilities at the Olsztyn tire plant in Poland have not been operating at full capacity, largely because of the lack of hard currency for these materials.\textsuperscript{13}

\textsuperscript{11}Angel Mandazhiev, "The Madara Truck Plant: A Project With Many Unsolved Questions," Ikonomicheski Zhivot, July 2, 1975, p. 4.
\textsuperscript{11}Dariusz Piatkowski, "Interview with Manager Eng Henryk Olejniczak, Director of the Stomil Association of Rubber Products Industries," Zycie Warszawy, December 14, 1978, pp. 1, 9.
Lowered production in one country, for whatever reason, ripples through CEMA specialization and cooperation projects, causing shortages and lowered exports elsewhere. Since Poland is involved in a number of bilateral specialization agreements in the production of tires, the Polish tire shortage also affects other CEMA countries. Poland and Hungary have a mutual specialization agreement in tires—Hungary produces tires for trucks and Poland for automobiles. Because of delays in Polish deliveries of automobile tires in 1979, the Hungarians limited their exports of rubber products for trucks.14

SPECIALIZATION AGREEMENTS AND ECONOMIC INTEGRATION

One goal of specialization agreements is to increase economic integration to maximize efficiency by dividing production among states and producers. To make this concept operational, we define the level of economic integration as the percentage of a country's transactions in motor vehicles conducted with another country. The higher the percentage of transactions with another country, the greater the level of economic integration. If the percentage of motor vehicles in domestic consumption imported from a CEMA partner country increases over time, integration has increased. This is the metric we use to assess the effects of specialization agreements on increasing economic integration in the motor vehicle industry.

Table 8 shows the proportion of CEMA imports in motor vehicles by the GDR, the Soviet Union, Bulgaria, Czechoslovakia, and Poland. Almost all of the products currently fall under specialization and cooperation agreements. The data indicate that the share of consumption is about the same in 1984 as in 1967. In some cases, it has actually declined. Declines are particularly apparent in car imports by the CEMA countries, which indicates that specialization in cars has not increased since the late 1960s.

Table 8

MOTOR VEHICLE IMPORTS FROM CEMA
(Percent of national consumption\(^a\))

| Year | GDR Cars | GDR Trucks | GDR Buses | Soviet Union Cars | Soviet Union Trucks | Soviet Union Buses | Bulgaria Cars | Bulgaria Trucks | Bulgaria Buses | Czechoslovakia Cars | Czechoslovakia Trucks | Czechoslovakia Buses | Poland Cars | Poland Trucks |
|------|----------|------------|-----------|-------------------|--------------------|--------------------|-----------------|----------------|----------------|-----------------|---------------------|--------------------|-----------------|---------------|---------------|
| 1967 | 31.7     | 10.8       | 57.7      | 7.5               | 0.3                | 91.5               | 99.2            | 98.8           | 28.6           | 12.5             | 41.6               | 20.0             |
| 1968 | 35.1     | 21.7       | 55.5      | 8.8               | 0.6                | 85.7               | 30.6            | n.a.           | 35.2           | 19.8             | 26.1               | 14.3             |
| 1969 | 35.0     | 31.6       | 56.3      | 7.8               | 0.8                | 74.8               | 16.5            | 79.4           | 40.8           | 19.8             | 27.2               | 16.6             |
| 1970 | 40.0     | 30.0       | 44.5      | 7.6               | 0.9                | 74.4               | 29.8            | 83.1           | 37.8           | 17.0             | 28.9               | 19.2             |
| 1971 | 50.8     | 26.0       | 26.9      | 8.9               | 1.3                | 83.6               | 11.5            | 92.1           | 48.5           | 12.8             | 35.2               | 16.8             |
| 1972 | 52.6     | 43.8       | 30.8      | 6.9               | 2.6                | 84.8               | 32.0            | 74.3           | 54.4           | 17.0             | 37.1               | 17.2             |
| 1973 | 47.5     | 39.7       | 36.0      | 6.8               | 2.0                | 81.5               | 32.7            | 67.5           | 64.2           | 21.2             | 38.4               | 17.8             |
| 1974 | 55.0     | 32.4       | 34.1      | 6.6               | 0.9                | 80.5               | 28.4            | 67.3           | 50.6           | 17.6             | 21.3               | 15.4             |
| 1975 | 50.6     | 33.9       | 37.0      | 5.8               | 0.7                | 79.8               | 24.3            | 58.8           | 50.8           | 15.5             | 16.1               | 13.0             |
| 1976 | 56.0     | 25.5       | 33.7      | 6.3               | 0.4                | 81.7               | 27.8            | 28.4           | 48.3           | 12.8             | 12.9               | 10.4             |
| 1977 | 44.7     | 24.1       | 33.7      | 6.5               | 1.2                | 83.8               | 30.0            | 44.3           | 48.8           | 14.9             | 16.8               | 17.0             |
| 1978 | 49.1     | 27.0       | 34.8      | 3.1               | 1.1                | 83.9               | n.a.            | 34.6           | 49.2           | 15.8             | 13.3               | 21.1             |
| 1979 | 41.4     | 25.1       | 31.7      | 2.8               | 1.1                | 84.7               | n.a.            | 29.1           | 44.8           | 14.5             | 7.7                | 28.4             |
| 1980 | 39.5     | 22.5       | 32.1      | 2.8               | 1.3                | 83.2               | n.a.            | 19.9           | 35.9           | 12.2             | 5.9                | 30.0             |
| 1981 | 26.7     | 17.1       | 21.2      | 3.0               | 1.1                | 77.6               | n.a.            | 8.3            | 21.0           | 8.0              | 22.3               | 26.6             |
| 1982 | 19.2     | 13.9       | 25.5      | n.a.              | n.a.               | 78.0               | n.a.            | 10.5           | 16.0           | 1.5              | 22.5               | 12.4             |
| 1983 | 6.3      | 6.9        | 31.9      | n.a.              | n.a.               | 74.5               | n.a.            | 10.9           | 13.4           | 5.6              | 19.8               | 13.8             |
| 1984 | 11.5     | 8.7        | 31.9      | n.a.              | n.a.               | 76.7               | n.a.            | 6.5            | 15.3           | 5.4              | 11.4               | 13.3             |

NOTE: Sources as in Table C.1.

\(^a\)National consumption is calculated here as production minus total exports plus total imports for each commodity. This value was obtained from estimates in Hunter et al. (1985) for the Soviet Union, because official sources have included import and export data only in terms of current year ruble value since 1976. Figures for other countries were obtained from their statistical yearbooks. Percentages are estimates based on fragmentary information available in the official statistical yearbooks. Numbers may be biased downward due to the lack of foreign trade figures for Hungary and Romania.
Specialization can also be measured by the percentage of total motor vehicles produced by one CEMA country that are exported to its partners. If specialization has occurred, one would expect the specializing country to export a greater share of its output. Table 9 summarizes Tables C.4, C.5, and C.6, showing that product specialization in cars has clearly declined overall since 1970, while specialization in trucks has risen in Czechoslovakia and in the GDR. Specialization in buses has also increased from a relatively high level in Hungary. The summary for Poland is somewhat misleading, since bus exports peaked as a percent of production (60.4) in 1978, and the numbers are currently declining from that level (see Table C.6).

Table 9
EAST EUROPEAN AND SOVIET MOTOR VEHICLE EXPORTS TO CEMA IN 1970 AND 1984 (Percent of national production)

<table>
<thead>
<tr>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Czechoslovakia</td>
<td>51.7</td>
<td>35.8</td>
<td>35.0</td>
<td>46.1</td>
<td>26.1</td>
<td>4.1</td>
</tr>
<tr>
<td>GDR</td>
<td>43.7</td>
<td>31.5</td>
<td>50.8</td>
<td>62.9</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Hungary</td>
<td>--</td>
<td>--</td>
<td>n.a.</td>
<td>n.a.</td>
<td>77.4</td>
<td>86.3</td>
</tr>
<tr>
<td>Poland</td>
<td>36.9</td>
<td>21.4</td>
<td>19.6</td>
<td>19.4</td>
<td>12.4</td>
<td>31.1</td>
</tr>
<tr>
<td>Romania</td>
<td>13.6</td>
<td>5.3</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>17.6</td>
<td>6.1</td>
<td>2.3</td>
<td>n.a.</td>
<td>0.6</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

NOTE: Sources as in Table 7.
\(^a\)Data for Bulgaria are not available.

We also attempted a statistical test of the hypothesis that countries should become more economically integrated following the conclusion of a specialization or cooperation agreement.\(^{15}\) We

\(^{15}\)See Appendix C for a detailed presentation of the results.
examined only bilateral agreements, using the following linear regression model:

\[ Y = \alpha_1 + \beta_1 \text{TIME} + \beta_2 \text{DUM} + \varepsilon \]  

(1)

where \( Y \) is a univariate transformation of the proportion (P) of motor vehicle goods produced by one CEMA country that are exported to its partner, namely \( \arcsin \left( P/100 \right)^{1/2} \); \( \text{TIME} \) is the year minus 1969; \( \text{DUM} \) is a variable which takes the value of 0 before an agreement was signed and \( \text{TIME} \) afterwards; and \( \varepsilon \) is the error term. The coefficient of \( \text{DUM}, \beta_2 \), captures changes in the time trend in P following the agreement. We used this coefficient to test whether the rate of change in P increased following the signing of the agreement.\(^{17}\)

The regression model in Equation (1) was also used to characterize integration in terms of imports as a percentage of national consumption. In this regression, \( Y \) is the \( \arcsin \left( C/100 \right)^{1/2} \), where \( C \) is the proportion of motor vehicles that a CEMA country imports from its partner in its total motor vehicle consumption (production minus exports plus total imports). The variables on the right-hand side of the equation are the same.

As noted above, specialization agreements almost invariably involve exchanges of motor vehicle products. Countries appear to be unwilling to agree to import a good unless the exporting country agrees to accept some similar product in exchange. Consequently, countries are sometimes exporters and importers of the same product. For example, the Soviet Union and the GDR export trucks to each other.

As specialization increases, we would expect to see export penetration increase in both countries. For example, if specialization

\(^{16}\)This transformation is commonly applied to proportions to stabilize variance. See S. Weisberg, \textit{Applied Linear Regression}, 2nd ed., John Wiley & Sons, New York, 1985, p. 134.

\(^{17}\)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.
is successful, the Soviets, who specialize in heavy trucks, should increase their share of the East German truck market, as East German substitutes are replaced with Soviet trucks. By the same token, we would expect the East Germans to increase their share of the Soviet truck market as their medium-sized trucks replace Soviet substitutes. Thus, our metric should detect increases in specialization resulting from specialization agreements even in instances where the same type of vehicle is exchanged.

In none of the cases analyzed for automobile exports was the coefficient of the variable DUM (which indicates a shift in the rate at which the export share of production changes following a specialization agreement) positive and significant at the 0.05 level (see Table D.1 in Appendix D).\(^1\) In fact, in some instances, the coefficient was negative and significantly different from zero, reflecting a downward trend in specialization in car production. This is true of Soviet car exports to all of the East European CEMA countries. The results indicate that specialization in car production was either not positively related to the signing of a specialization agreement or was in some other way adversely affected during the 1970s and early 1980s.

Patterns in truck and bus specialization were similar. The coefficient of the variable DUM was positive and significant in only one of the cases analyzed: Czech truck exports to the Soviet Union following the signing of a specialization and cooperation agreement (see Table D.2). Thus, the regressions for trucks and buses also generally indicate no obvious positive relationship between the signing of an agreement and an increase in the share of exports delivered to the partner country over time.

\(^{1}\)Correlations between the dummy variable and time revealed that they are linearly related in many cases (see Appendix D). This multicollinearity could lead to large standard errors on the coefficients, causing too frequent acceptance of the null hypothesis that specialization agreements have had no effect on trends in economic integration. However, for the most part, when the coefficient on the dummy variable was statistically significant, it was negative, indicating strong negative rather than positive trends in integration following an agreement.
Trends in the proportion of motor vehicle imports in total national consumption (production minus exports plus imports) falling under a specialization agreement were generally similar to those for export market shares. However, Bulgaria, Hungary, and Poland significantly increased the share of automobile imports in domestic consumption from Czechoslovakia, Poland, and the Soviet Union, respectively, following the signing of agreements (Table D.4). Likewise, the Soviet Union significantly increased the share of trucks imported from Czechoslovakia in total domestic consumption, mirroring the increased exports described above (Table D.5).

These hypothesis tests indicate that specialization agreements have generally been of limited effectiveness in increasing economic integration in the motor vehicle industry. The hypothesis that specialization agreements do not increase integration could be rejected at the 5 percent level of significance in only 5 of 41 tests. On the other hand, the alternative hypothesis that specialization agreements increase integration could be rejected in 13 tests and for all specialization agreements in automobiles signed by the Soviet Union.

A major reason for the apparent failure of agreements to increase integration in the automobile industry is the East European and Soviet demand for hard currency. To obtain hard currency, the CEMA countries sometimes sell goods produced under specialization agreements on the Western markets. Such a diversion of motor vehicle products has been evident since 1981. From 1976 to 1980, the Soviet Union exported 1,075,571 passenger cars to the other CEMA countries. However, this number dropped to 396,725 for the 1981-1985 period. Trade data in the Soviet statistical yearbooks confirm that the country exported a larger proportion of its passenger car output to the West in 1980-1985.

This reorientation of trade brings into question the reliability of partners in specialization and cooperation agreements. If the CEMA countries cannot depend on their partners for sufficient quantities of the commodities specified in those agreements, they are unlikely to be willing to eliminate or reduce production capabilities of those commodities in their own countries.
The problems caused by the diversion of exports are evident in the case of the GDR. The GDR has been experiencing severe shortages of passenger cars, largely because the Soviet Union has reduced its exports of passenger cars to the GDR. Although the Soviet Union planned to ship about 30,000 vehicles to the GDR in 1986, only about 1,500 had reportedly been delivered by the end of the year.\textsuperscript{19}

Meanwhile, Poland had discontinued automobile exports to the GDR by the end of the 1970s. Only Czechoslovakia continued to ship cars in substantial quantities: 22,000 Skodas during 1981.\textsuperscript{20}

By 1986, the GDR was expressing dismay at the increasing tendency to export cars to the West. Reports in the GDR press claimed that Czechoslovakia planned to deliver a new version of the Skoda (based heavily on Western technology) to the West in 1987. The Romanians have already begun to export their Olt-Cit to Western Europe under the name Axel.\textsuperscript{21}

The passenger car industry of the GDR is not in a position to easily adapt to this diversion of trade. It has suffered from a lack of modernization since World War II. Continuing delays in modernizing\textsuperscript{22} the GDR car industry may be due in part to a lack of hard currency to pay for modern Western production equipment and other technical assistance.\textsuperscript{23} On the other hand, they may also be due to a policy decision taken with the expectation that other CEMA countries would supply the GDR with automobiles.

The GDR's strategy for coping with its passenger car shortage has been primarily to limit exports of its own cars. 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.\textsuperscript{24} Thus, it

\textsuperscript{21}Stipsicz, 1986.
\textsuperscript{22}Sobell, 1984, p. 174.
\textsuperscript{23}Edwards and Fraser, 1977, p. 401.
\textsuperscript{24}Stipsicz, 1986.
is unlikely that the GDR would consider phasing out its own passenger car production in the future.

Currently, the GDR is taking measures to modernize its automobile industry. An engine plant supplied by Volkswagen is under construction in the GDR. One-third of the 300,000 units produced there annually are scheduled for export to the West, while the remainder will be delivered to CEMA countries.25

The fact that the Soviet Union can and does renege on commitments to supply a commodity produced under CEMA specialization agreements suggests that these agreements are not likely to achieve their desired goals. It is unlikely, for instance, that the GDR will continue to rely on the Soviet Union for passenger car exports, when the Soviets are capricious about deliveries. Thus, the GDR might turn to another CEMA country to obtain its passenger cars, or more likely, it will continue to maintain the capability to produce cars itself.

COMPONENT EXCHANGE

East European economists have concluded that production cooperation in parts and subassemblies is an area in which specialization and cooperation have been highly unsatisfactory.26 On the other hand, Soviet analysts report rapid progress in this area.27 This dilemma is difficult to resolve, because information on the exchange of components and subassemblies is fragmentary at best in the official statistical yearbooks. We have compiled some estimates of component exchange, however, that may provide some information.

Table 10 shows the value of components exported annually as a proportion of the value of total motor vehicles exported. The data indicate that the share of components in motor vehicle trade among the East European countries has, for the most part, stagnated from 1967 to

25Ibid.
Table 10

EAST EUROPEAN AND SOVIET COMPONENT EXPORTS
FOR MOTOR VEHICLE PRODUCTION

(Percent of components in total motor vehicle exportsa)

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


aPercentages 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. Data for Bulgaria and Romania are not available.

1983. Except in Hungary, specialization agreements appear to have had no effect on these percentages. The large percentage increase in the 1983 estimate for the Soviet Union is the result of drastically reduced Soviet exports of motor vehicles to CEMA, rather than increased levels of component trade.
These figures support the hypothesis that specialization and cooperation agreements have not been particularly effective in increasing the motor vehicle cooperation at the level of parts and subassemblies. On the other hand, they indicate that trade in motor vehicle components is a significant part of total motor vehicle trade.

TECHNICAL PROGRESS

One goal of specialization agreements is to foster innovation both by distributing the burden of research and development (R&D) among the CEMA countries and by promoting closer cooperation in sharing the results of R&D experience.

The exchange of R&D in the motor vehicle industry tends to be encompassed in science and technology agreements. We did not explore the extent of such exchange under these agreements, but official CEMA statements acknowledge that the slow technological progress of the CEMA countries is a bottleneck to intensifying production capabilities.\(^2\)

It appears unlikely that specialization and cooperation agreements will foster intra-CEMA technological advancement in the future. The agreements apparently accommodate the continuing production of obsolete items, with little or no provision for advancements or improvements.\(^3\)

Several factors are cited as contributing to the sluggish rate of technological advancement. One factor is the restricted use of reserve funds set aside in the majority of CEMA countries to enable organizations to support technological development and to subsequently take on the financial risks of introducing innovations at the enterprises. These risks are compounded by the losses that may be incurred because of the necessity to diminish the normal level of output as a tradeoff in developing the new technology.

Much of the past progress in motor vehicle technology in Eastern Europe is attributable to the purchase of licenses from the West rather

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than intra-CEMA innovation. Early Soviet motor vehicle construction (circa 1930) was based on licenses from the United States.\textsuperscript{30} Later, in the mid-1960s, the Soviet Union and Poland both purchased Fiat licenses from Italy. The Hungarian industry has also benefited from the purchase of a license from the Austrian Steyr-Daimler-Puch firm for the production of trucks and buses and another license from MAN of West Germany, principally for the production of diesel engines and rear axles. Romania produces its Dacia passenger car under license with the French Renault firm, and Czechoslovakia manufactures a light service van (Avia) with the assistance of Saviem, a subsidiary of Renault.

**PRICING MECHANISM**

In our examination of the effectiveness of CEMA specialization and cooperation agreements, we briefly considered the effects of the CEMA pricing system on implementation of the agreements.

The exclusive regional interaction promoted by CEMA policymakers creates a situation in which the member countries are not exposed to the external competition of markets in the West. This situation can serve to isolate the East European countries from world markets by allowing them to continue to produce and sell technologically inferior products among themselves, rather than restructuring their industry to meet the demands of competition.

East European scholars frequently blame many of the shortcomings of CEMA integration on the suppression of market and monetary relations.\textsuperscript{31} The payment system in CEMA is based on the transferable ruble. In CEMA, a ruble earned from exports of motor vehicles generally cannot be used to purchase a ruble of another commodity. This state of affairs limits trade and specialization.

The CEMA mechanism for setting prices also creates trade problems under specialization and cooperation agreements. Prices are formed on


\textsuperscript{31}Pecsi, 1981, p. 91
the basis of world prices for comparable goods "stripped" of the
influence of competition and averaged over the previous five years. ¹²
These figures are based on developments in the world market of the past
and thus can be predicted only in an uncertain manner.

In addition, most components and subassemblies do not have easily
ascertainable world market prices. In these cases, prices are based on
production costs, the computation of which differs substantially among
the countries. These pricing problems sometimes discourage
manufacturers from exporting, leading to more domestic production and
less dependence on foreign markets because exports may appear
unprofitable. ¹³

One of the effects of the CEMA pricing mechanism on specialization
and cooperation is that it encourages bilateral rather than multilateral
relations. Strict attention is paid to bilateral balancing in terms of
payment in kind for the transactions. ¹⁴ It seems likely that this
continuing focus on bilateral relations will tend to retard the process
of economic integration in the long term.

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.

The difference between such exchanges is exemplified in a new
Hungarian-Soviet cooperation agreement, signed by the heads of Moguert,
Autker, Ikarus, and Soviet Autoexport. Hungary will export Ikarus
buses, caravans, and bus spare parts. In return, the USSR will export

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¹²A. Velharticka, "Extensive Methods Show Inadequate Results,"
Hospodarske Noviny (in Czech), No. 27, 1986, p. 3.
¹³Ibid.
¹⁴Bauer and Soos, 1979, p. 292; M. Babosik, "The FTOs in Intra-CMEA
passenger cars (old-model Ladas, Moskvitches, etc.), microbuses, and spare parts. Hungarian Moguert will also purchase (probably in hard currency) 500 units of the newest front-wheel-drive Lada Samara models.\textsuperscript{35}

Adherence to bilateral balancing by sector is ultimately disadvantageous, because it limits the technological advancement of production. For instance, in the motor vehicle industry, the price of equipment from the West is not comparable with prices of products produced among CEMA countries. Therefore, subassemblies originating from outside CEMA cannot be built regularly into vehicles to be sold at home or in the CEMA market; the advantages offered by Western subassemblies cannot be incorporated into a standard vehicle design.\textsuperscript{36}

CONCLUSIONS

It appears that specialization and cooperation agreements have had very limited success in reducing duplication. Production of all motor vehicle types is still widely spread across the CEMA countries.

Economic integration in motor vehicle exchange has rarely increased with the signing of specialization agreements; in some cases (e.g., automobiles), it actually declined. This was partly the result of larger shipments of motor vehicles to Western markets, but it was also due to absolute declines in exports in the 1980s. Given the unreliability of suppliers in fulfilling commitments, it is unlikely that individual countries will be willing to forgo national production capabilities despite the existence of specialization agreements.

In general, neither the percentage of production exported to a partner in a specialization agreement nor the percentage of consumption imported from a partner increased after the signing of an agreement. For example, the proportion of Soviet truck exports to Poland did not appear to increase following a bilateral agreement under which the Soviet Union would deliver KamAZ trucks to Poland in exchange for brake apparatus.


\textsuperscript{36}Bauer and Soos, 1979, p. 292.
The most striking exception occurred in Czechoslovak truck exports to the Soviet Union following the signing of an agreement. Czechoslovakia significantly increased the share of trucks it produced for export to the Soviet Union, and the Soviets significantly increased the share of imported Czechoslovak trucks in their overall consumption. In this case, a specialization agreement may have contributed to closer economic ties between Czechoslovakia and the Soviet Union in trucks. Several other exceptions occurred in automobile imports as a percentage of consumption.

Two other goals of specialization and cooperation agreements, increased trade in components and increased innovation, apparently have not been met in the motor vehicle industry. The share of component trade in total motor vehicle trade has stagnated since the early 1970s, and little intra-CEMA technological innovation has been introduced. It appears unlikely that the agreements serve to foster technological advancement, since they accommodate the continuing production of obsolete items, with little or no provision for advancement or improvements.

The effective implementation of specialization and cooperation is hampered by a number of demand and supply constraints, discussed above. In view of these obstacles, it appears that specialization and cooperation agreements have not provided a successful solution to the problem of increasing integration and enhancing industrial production within the CEMA motor vehicle industry.
Appendix A

ORGANIZATION AND PRODUCTION CAPABILITIES
OF THE MOTOR VEHICLE INDUSTRY IN CEMA

NATIONAL BUREAUCRATIC ORGANIZATIONS AND PRODUCT LINES

Bulgaria

Industrihavenski stopanski obedineniya (DSO). At the beginning of the 1970s, DSOs were given most of the responsibility for managing the enterprises beneath them. They lasted in this form only until the mid-1970s, when organizations of varying degrees of authority (state economic combines and united economic enterprises) were set up to help coordinate industrial policy. Kaser (1981) states that in the new hierarchy, all entities including the branch ministries were considered economic organizations, functioning as both organs of the state and economic (self-financing) organizations. Since then, Bulgaria has undergone further administrative reorganizations, which first abolished, then resurrected ministries.

The organizational hierarchy in the Bulgarian motor vehicle industry consists of the branch ministry (Ministry of Machine Building and Electronics) at the top, a number of DSOs beneath the ministry, and the enterprises at the bottom. The DSOs that have responsibility for the motor vehicle industry include Avtoprom, Balkancar, and Motor Technology and Automotive Services. Avtoprom handles the production of trucks. Balkancar oversees the production of tractors and electric lift (forklift) trucks. The Motor Technology and Automotive Services DSO is responsible for the management of motor vehicle maintenance and repair.

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Production Capabilities. Bulgaria's motor vehicle industry mainly consists of the manufacture of components for export to other CEMA countries and vehicle assembly. Despite a large number of specialization and cooperation agreements, the country remains the smallest producer of finished motor vehicles in CEMA (see Tables C.1, C.2, and C.3 in Appendix C).

The production capabilities of Bulgaria were developed almost entirely with the material and technical assistance of the Soviet Union. The first vehicle produced in Bulgaria, the GAZ-53A truck, was manufactured cooperatively with the Soviet Union. The truck was first assembled in 1967 at the Madara KA (motor vehicles combine) in Shumen. (The plant itself was constructed with Soviet assistance.) In 1980, this factory began production of the first diesel-powered truck made in Bulgaria, developed from the GAZ-53.

Bulgaria's cooperation in truck production expanded during the 1970s to include the co-production of Soviet ZIL and KamAZ trucks and Czechoslovak Skoda trucks. Bulgaria supplies the Soviet Union with power-steering mechanisms for the KamAZ and rear axles for other trucks. Bulgaria also assembles the 8- and 10-ton Skoda trucks at the Madara plant in Shumen, under Czechoslovak license. Czechoslovakia supplies engines with clutches, while Bulgaria supplies Czechoslovakia with rear axle assemblies plus other spare parts for these trucks. Bulgaria plans to eventually meet total Czechoslovak demands for the rear axle subassemblies of these trucks. Original estimates reported that this goal would be achieved by 1980; however, later studies indicate that Bulgaria has not yet realized this target.

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3Edwards and Fraser, 1977, pp. 396-419.
4Zhelyu Zholev, "From the Part to the Conveyor Belt," Zemedelsko Zname, August 28, 1975, p. 3.
7G. Chupin, "Integration of COMECON Countries in Auto Production," Voprosy Ekonomiki, No. 6, 1977, pp. 71-78.
cooperation in truck production was expanded in the early 1980s to include the joint manufacture of the Liaz-Madara 100.\textsuperscript{9}

Bulgaria is cooperating with Poland, Hungary, and Romania in bus production. Poland's Sanok bus factory produces Polish engines for a bus with a Bulgarian body, in the first Bulgarian-Polish specialization and cooperation project. Cooperation in bus production between Bulgaria and Hungary will continue through the 1980s. Hungary supplies components and subassemblies for a Bulgarian-made bus,\textsuperscript{10} the Setra, which is produced under an agreement with the West German firm Kassbohrer. The Setra has a Madara truck chassis.\textsuperscript{11} Bulgaria also imports Ikarus buses from Hungary. In return, Bulgaria exports hydraulic lifts and component parts for various vehicles. Bulgaria's Chavdar plant and Romania's motor vehicle industry are also cooperating in the production of a passenger bus.

Bulgarian participation in so many different bus production programs suggests that cooperation in this instance has given rise to parallel production and duplication. Although it appears that all the buses are made at one plant (Chavdar), the multiple cooperation programs make it hard to believe that Bulgarian bus production is efficient. Despite the agreements, Bulgaria remains the smallest producer of buses in CEMA (see Table C.3 in Appendix C).

Bulgaria is the leading producer of electric lift trucks in CEMA.\textsuperscript{12} The government has concentrated on developing the electromechanical industry and has specialized in the production of lift equipment. As a result, Bulgaria has become the biggest European producer of electric and motor lift trucks, and the second biggest producer of electric hoists.\textsuperscript{13} This specialization program has permitted Bulgaria to further

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\textsuperscript{11}Sобел, 1984, p. 180; Zhelev, 1975, p. 3.

\textsuperscript{12}Edwards and Fraser, 1977, p. 405.

\textsuperscript{13}Sобел, 1984, p. 181.
its cooperation with other CEMA countries within the motor vehicle industry. For instance, according to a general agreement for specialization and cooperation for 1981-1990, Bulgaria exports battery-driven and motor-driven forklifts to Romania, and in return, Romania produces 16-, 25-, and 50-ton dump trucks to meet Bulgaria's needs.\(^\text{14}\)

Enterprises that produce Bulgarian lift trucks include the Record complex in Plovdiv; the Star factory in Lukovit, which produces steering mechanisms; and the Balkan plant in Lovech, which produces components for motorized and electric forklift trucks.

Like the truck-producing industry, the passenger car industry in Bulgaria is not well developed. In 1984, Bulgarian automobile production accounted for only 0.7 percent of the total cars produced in CEMA countries (see Table C.1 in Appendix C). Bulgaria assembles Soviet Moskvich and Lada cars and Czechoslovak Skoda cars. Bulgaria also produces a variety of components for the Lada, and in return is supplied with assembled automobiles.

The Dinamo plant in Sliven supplies the Lada passenger car with generators and starters. The storage battery plant in the town of Pazardjik exports batteries to the Soviet Union for the Lada.

**Foreign Trade Organizations.** In Bulgaria, several FTOs are associated with the motor vehicle industry. They include Avtoimpex, Balkankarimpex, and Mashinoeksport.\(^\text{15}\)

Bulgarian FTOs are special state organizations which have been granted commercial and financial autonomy in all areas. The authorization to engage in foreign trade activities and the scope of these activities are determined by the Council of Ministers; however, the FTOs are economically independent, juridical bodies.\(^\text{16}\)


\(^{16}\)Manual on Trading with the Socialist Countries of Eastern Europe, 1985, p. 45.
major functions of Bulgarian FTOs are (1) to inform the economic (producer) organizations of conditions on the international markets; (2) to carry out all activities related to the export of goods produced in the country and to the import of required goods; (3) to participate in the preparation, conclusion, and implementation of contracts and agreements on economic cooperation and on specialization and cooperation in production; and (4) to assist in creating links between production at home and the international markets, as well as in the introduction of new products and the expansion of export output.\textsuperscript{17}

**Czechoslovakia**

**Industrial Management.** The Ministry of General Engineering oversees the motor vehicle industry in Czechoslovakia. It concentrates on elaborating Czechoslovakia's role in the international division of labor and socialist economic integration of the motor vehicle industry. It also determines necessary structural changes and industrial innovations. At the same time, the ministry is responsible for securing the "efficient and first-rate fulfillment of the plan targets" by enterprises.\textsuperscript{18}

The second tier in the Czechoslovak management system of industry consists of the "higher economic units" (VHJ). These organizations are considered to be the basic business unit for the industry. The VHJ is a collective of enterprises which is

the subject of taxation and payments to the State budget; the bearer of the central plan targets; and responsible for a "differentiated application" of the *khozraschet* principle to all its intra-organizational levels.\textsuperscript{19}

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\textsuperscript{17}Ibid.


\textsuperscript{19}Ibid.
The Czechoslovak motor vehicle VHJ is organized as a trust controlled by the Prague-based general management of the Czechoslovak Automobile Works (CAZ). This trust consists of 23 production enterprises comprising over 110 factories and 80 workshops.\(^{29}\) In addition, the trust has its own sales organization, Mototechna, which distributes Czechoslovak motor vehicles and spare parts, as well as its own Motor Vehicle Research Institute in Prague.\(^{21}\)

**Production Capabilities.** Czechoslovakia has maintained broad production capabilities within its motor vehicle industry. The country manufactures all classes of motor vehicles: automobiles, trucks, vans, buses, and motorcycles. In addition, Czechoslovakia engages in cooperation projects with virtually all the East European CEMA countries for the co-production of cars, buses, and trucks.

The Czechoslovak motor vehicle industry dates back to 1897. By the end of World War II, it was the best developed of all the motor vehicle industries in Eastern Europe. It included a half-dozen major car and truck manufacturers that survived with relatively little wartime damage. This postwar strength, together with a good export market, caused the government to give high priority to developing its motor vehicle industry after an initial period of neglect in the early 1950s, at the height of the Stalinist era. Such priority was not initially given to the automotive industries of the other East European countries.\(^{22}\)

Among the most prominent manufacturers in the CAZ are the AZNP (Automobile Works, National Enterprise), the Tatra National Corporation, the Liaz (Liberec Automobile Works), the Avia National Corporation, and the Karosa National Corporation. The AZNP is the producer of Skoda passenger cars and vans in Mlada Boleslav; the Tatra works produces heavy Tatra trucks; Liaz produces heavy trucks and towing vehicles; and

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\(^{22}\)Edwards and Fraser, 1977, p. 399.
Avia is the national producer of light trucks and vans. The main Avia plant was built under a French license from Renault in 1967.

Czechoslovakia specializes in the production of 12- to 14-ton Tatra trucks under a CEMA specialization agreement signed in the early 1970s. These trucks are in high demand in Eastern Europe and the USSR.

Passenger car production in Czechoslovakia is also well developed. The Skoda passenger car is the most popular Czechoslovak car among the CEMA countries. The Skoda is a subcompact with a rear engine and rear-wheel drive. Each year, about 180,000 Skodas are produced.

Despite the demand for the Skoda in CEMA countries, the car's design has been severely criticized. Production of the current type of Skoda vehicles was expected to be discontinued in 1987, when a new Skoda car with front-wheel drive was expected to appear in Western markets. The new model boasts a clutch developed in the Federal Republic of Germany (FRG) and disc brakes manufactured in England. According to the East German press, "This technology is packaged in an aerodynamic body, for whose styling . . . the star Italian designer Bertone is responsible."23

Motorcycles have also been produced in Czechoslovakia for a long time. Reports have recently appeared in trade journals that a long-term innovation program is being negotiated between the Soviet Union and Czechoslovakia for development of a four-stroke engine.24

**Foreign Trade Organizations.** There are two FTOs associated with the Czechoslovak motor vehicle industry. The major FTO is Motokov of Prague,25 which establishes commercial relations with the FTOs of other CEMA countries and Western firms. Trade between Motokov and organizations in other socialist countries accounts for nearly three-quarters of Motokov's overall trade turnover.26 Motokov deals primarily

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24Ibid.
26Kubanek, 1985, p. 10.
with completed vehicles and subassemblies. The other FTO is Mototechna, the sales organization associated with the CAZ trust. Most trade in spare parts occurs through Mototechna rather than Motokov.\textsuperscript{27}

The GDR

**Industrial Management.** In an attempt to build a more efficient industrial management system, the GDR has reduced the number of management levels above the enterprise from three (ministry; association of nationalized enterprises (VVB); and an enterprise/combine level) to two (the ministry and combine levels).\textsuperscript{28}

Combinates, directly subordinate to the relevant ministry, were created by the amalgamation of enterprises formerly belonging to one VVB. The combines now have the following responsibilities with respect to CEMA: (1) to present, together with foreign trade enterprises, suggestions and alternative solutions for economic, scientific, and technological cooperation in CEMA; (2) to guarantee the scheduled fulfillment of commitments ensuing from international trade contracts; (3) to coordinate the development of research and productivity with the relevant CEMA member countries and to organize the exchange of experience; and (4) to form trade contracts concerning specialization and production cooperation with CEMA partners, together with the relevant foreign trade enterprises. These duties comprise a subset of the combine's overall industrial management responsibilities.

Just how much decisionmaking autonomy the combine actually has, however, is not clear. Ministries continue to exercise their decisionmaking rights, occasionally intervening at the level of the enterprise itself.

The structure within a combine can vary, depending on the industry. In the combines of the motor vehicle industry, several enterprises are


\textsuperscript{28} Except where otherwise stated, this section is based on Manfred Melzer, "Combine Formation and the Role of the Enterprise in East German Industry," in Jefferies (ed.), 1981, pp. 95-113.
directed by a parent enterprise. Individual enterprises within these combines are independent legal and economic entities.

The ministry responsible for the motor vehicle industry in the GDR is the Ministry of Processing Machines and Machine Building. This ministry is the organization that concludes specialization agreements with other CEMA countries.29 There are four combines in the GDR motor vehicle industry: the IFA Passenger Vehicles Combine, the IFA Truck Combine, the IFA Combine of Two-Wheeled Vehicles, and the IFA Combine of Specialized Vehicles and Trailers.30

**Production Capabilities.** East Germany concentrates on the production of passenger cars and light trucks. The GDR produces two small automobiles—the Wartburg and the Trabant—which have two-stroke engines of very old design. The lubricating oil for these engines is poured into the fuel tank, making it impossible for the engine to achieve strict emission standards.

In the past several years, the East European countries have become increasingly conscious of pollution from motor vehicles. In Poland, for instance, 1986 was supposed to have been the last year that vehicles with two-cycle engines could be imported from the GDR. However, Poland plans to continue importing these vehicles (9,700 Wartburg and Trabant cars in 1987) because of the demand for them.31

East Germany is involved in a cooperative program with the USSR for co-production of the Soviet Lada. The GDR supplies the Soviet Union with brake systems for the Lada and other parts, and in return receives assembled Lada cars. The GDR also imports Moskviches from the Soviet Union, Skodas from Czechoslovakia, Fiats from Poland, and Dacias from Romania.

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30Heinzmann, 1984, pp. 57-61; Shastitko, 1985, p. 64.

The GDR produces a truck with a 5-ton cargo capacity (the W 50). This truck is manufactured under the National Enterprise IFA (the Union of Trucks) at Ludwigsfeld. It is exported to Hungary, Czechoslovakia, and the USSR. In 1985, 32,000 W 50 trucks were scheduled to be produced. East Germany also makes the 2.5-ton Robur truck, which it exports to Poland and Hungary.

The East German demand for heavy vehicles such as large trucks and buses is satisfied by imports from the other CEMA members. The Soviet Union supplies the GDR with KamaZ and BelAZ heavy trucks. Czechoslovakia exports Tatra trucks and Avia vans to the GDR.

By 1973, full-sized buses were no longer produced in East Germany. Hungary furnishes the country with Ikarus buses in exchange for either the W 50 truck or GDR-produced Ikarus bus components. This suggests that specialization and cooperation are proceeding successfully between the GDR and Hungary in this area.

Among the enterprises in the Passenger Vehicles Combine are the VEB motor vehicle works in Eisenach, where the Wartburg is produced, and the VEB Sachsenring in Zwickau, where the Trabant is produced.

In the Truck Combine, the parent enterprise is the motor vehicle factory in Ludwigsfelde. Not only is this enterprise the largest in the combine, it also manufactures the widest variety of products. It is this enterprise that produces the IFA W 50 truck, the GDR's most important motor vehicle export in CEMA. In addition, the enterprise produces the IFA Robur minibus and the IFA Multicar truck.

**Foreign Trade Organizations.** Foreign trade enterprises (AHBs) have, for the most part, been subordinated to combines, to increase exports by linking production and sales on the world market. Close relations between the AHBs and producers are supposed to improve product mix and increase export efficiency.

However, in the motor vehicle industry, the major foreign trade enterprise, Industrieanlagen-Import, is supervised solely by the

\[^{32}\text{Albert} \text{ Hinze, "Auto Purchases in the GDR a Trial of Patience: VW Shipments Not Expected to Change Years-Long Waiting Times," Sueddeutsche Zeitung, November 15, 1984, p. 36.}[^{32}]\]
Ministry of Foreign Trade. Ministrieanlagen-Import carries out trade operations for the motor vehicle program on the basis of governmental authority and approval in accordance with the foreign trade plan. It has the authority to negotiate and sign international commercial contracts with trading partners. It has the legal position of an enterprise but at the same time is still subject to the tasks, rights, and duties assigned by the Ministry of Foreign Trade.

Another AHB which handles export and import of trucks and buses is the Transportsmaschinen-Export-Import.

Hungary

Industrial Management. Unlike the systems in the other CEMA countries, Hungarian industry is organized as a two-tiered system beneath the central authorities. The first tier is occupied by the industrial branch ministries; the second tier is composed of the enterprises, which fall directly under the purview of the ministries. For the most part, there are no intervening associations, trusts, combines, etc., between the enterprises and the branch ministries.

The branch ministry in the industrial sector has a much more limited decisionmaking role in Hungary than in the other CEMA countries. The ministry oversees the enterprises in its sector and appoints a board of directors which evaluates enterprise upper management. The ministry also participates in decisions on large investments and helps settle disputes between enterprises.

The branch ministry for the motor vehicle industry is the Ministry of Industry, which was created in 1980. It consolidated the duties of

\[4\] Ibid., p. 11.
\[7\] Ibid., p. 142.
three former ministries, including the Ministry of Metallurgy and Engineering, which previously supervised the motor vehicle industry.

The current philosophy is that this ministry should confine itself to formulating overall industrial development strategy and should not intercede in the decisionmaking responsibilities of the enterprise managers, although in practice intervention is common. Crane (1983) states that to ensure a smaller role in the economy for the Ministry of Industry, the number of employees was cut 50 percent from pre-1980 levels.

Hungarian enterprises are much more autonomous than those in the other CEMA countries. Managers are free to make many of the same kinds of decisions made by their Western counterparts: what to produce, what inputs to use, which sales areas to emphasize, etc. The enterprise is expected to be profitable, and managers are judged in part on their success in increasing profits.\(^{38}\)

**Production Capabilities.** Of all the CEMA countries, Hungary is most often held up as an example of successful specialization in production. During the mid-1960s, Hungary decided to forgo production of passenger cars and concentrate on the manufacture of buses, trucks, and tractors. This decision was made from the CEMA perspective, especially in response to Soviet demand for these vehicles.

By the late 1960s, Hungary decided to streamline motor vehicle production even further and stopped producing tractors and trucks. The decision was based on the recognition that other CEMA countries were expanding production of these items and were exporting them at a lower price than the cost to manufacture them in Hungary and because of domestic production problems.\(^{39}\)

The decision to stop the production of tractors, trucks, and dump trucks caused some significant problems, however. Two large, important enterprises, the Red Star tractor factory and the Csepel auto factory, lost their major product lines. These factories were among the 60

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\(^{38}\)Ibid., p. 145.

\(^{39}\)In 1970, 2,500 dump trucks should have been produced, but only 1,400 were manufactured; 7,000 tractors were planned, but only 2,000 were produced.
largest Hungarian enterprises. They employed large numbers of industrial workers, and their closure would have caused political and ideological problems. The government responded by liquidating the Red Star tractor factory and splitting its assets between Raba and the Hungarian Elevator and Lift Factory. Csepel was simply reduced in size and given the job of manufacturing bus chassis.

Hungary presently concentrates on the production of buses and motor vehicle components, particularly rear axles. The three major motor vehicle enterprises are the Ikarus bus plant near Budapest, the Csepel motor vehicle factory, also in Budapest, and the Raba plant at Gyor. Ikarus produces buses, and Raba produces diesel engines and rear axles under MAN license. Raba also assembles MAN heavy trucks from imported components. Hungary is currently cooperating in the production of trucks, mainly with the USSR, Czechoslovakia, and Poland. At the Csepel plant in Budapest, truck and bus chassis are assembled, as well as entire trucks. Csepel also produces subassemblies such as power-steering mechanisms and the gear bow end of the torque converter transmission for trucks and buses. In addition, Hungary exports Raba rear axles for trucks to the Soviet Union, Poland, and Czechoslovakia.

Foreign Trade Organizations. Foreign trade in the Hungarian motor vehicle industry is largely conducted by the Moguert FTO. Hungarian enterprises, however, are increasingly able to obtain their own foreign trading rights, and some motor vehicle trade now occurs through the enterprises themselves. For instance, the Raba factory exports through its own FTO as well as Moguert.

Joint trade organizations are also being formed between the enterprises and Moguert. Ikarus and Moguert have set up a special subsidiary called "Hungarian Busexport" exclusively for trade on the hard currency markets.

\[4]\text{Sobell, 1984, p. 178.}
\[4]\text{Ibid.}
Hungarian FTOs are autonomous legal entities. They are able to decide how to make use of their capital and what and where to buy and sell. 44 Despite this independence, the Ministry of Foreign Trade evaluates the performance of those FTOs that fall under its control, such as Moguert. If an FTO is owned by the production enterprise, it is evaluated by a board composed of the managers of the enterprise, although the Ministry of Foreign Trade can contribute to decisions. 45

Poland

Industrial Management. In 1982, the Polish government reorganized the structure of industrial management as part of a larger national economic reform. Branch ministries were consolidated, and many trusts were liquidated. However, the reform has been only partially implemented, and enterprise associations continue to play an important role in industrial management.

The Polish motor vehicle industry fell under the purview of the Ministry of Metallurgy and the Engineering Industry, 46 which has since been amalgamated into the Ministry of Industry. The ministries have been concerned with the economic performance of the motor vehicle industry. They also have substantial control over the allocation of investment and inputs into the industry, and they monitor output.

The second tier of management in the motor vehicle industry is organized as an association of enterprises under the name POLMO (Association of the Motor Industry). 47 All the enterprises that are involved in the production of motor vehicles are grouped horizontally in

44 Manual on Trading with the Socialist Countries of Eastern Europe, 1985, p. 45.
45 Crane, 1983, p. 149.
this association. The association centralizes common functions, especially in investment, research, and international trade.⁴⁸

**Production Capabilities.** Like Czechoslovakia, Poland maintains a broad product range within its motor vehicle industry. Poland exports passenger cars widely among the CEMA countries and specializes in the production of light service vans, the Zuk and Nysa.⁴⁹ Poland also cooperates with the Soviet Union in the production of heavy trucks and buses.

Poland produces three types of passenger cars: the Fiat 125p mid-sized car, the 126p subcompact, and the Polonez. These cars are primarily based on Fiat technology. Poland purchased its first license to produce the "Polski Fiat" from Italy in 1965. Since then, Fiat production has expanded at a great rate: In 1975, about 85 percent of the 173,000 cars produced were Fiats (125p and 126p);⁵⁰ by 1980, 214,000 Fiat 126p cars were produced. The 1987 production goal for the Fiat 126p is 250,000.⁵¹

The two primary manufacturers of automobiles in Poland's motor vehicle industry are the FSO (*Fabryka Samochodów Osobowych*, passenger car factory), and the FSM (*Fabryka Samochodów Maly Osobowych*, subcompact car factory). FSO manufactures the Fiat 125p and the Polonez. The Fiat 125p is due to be phased out of production by the end of the 1980s. A new, smaller model that will get better fuel consumption is to be developed to take its place.⁵² FSM produces the Fiat 126p.⁵³ Both the FSO and the FSM factories cooperate in the development and production of engine components used in compact and mid-sized cars.⁵⁴

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⁵⁰Edwards and Fraser, 1977, p. 403.
⁵¹Dobosz, 1984, pp. 117-123.
⁵²Ibid.
⁵⁴Dobosz, 1984, pp. 117-123.
In 1980, Fiat decided to discontinue producing its 126p model because of declining sales. However, the company believed that there would be a continuing market for the car, so the car is still for sale in Western markets but is now produced solely by Poland.55 In 1985, Fiat again renewed its contract with Poland for production of the 126p--now renamed the 126-Restyling. The contract extends until 1991 and provides for a completely updated version of the car. This new Fiat was scheduled to appear on the market by 1987.56

The fact that both the Soviet Union and Poland are producing passenger cars based on Fiat technology has probably facilitated Poland's extensive CEMA cooperation in automobile production. In 1977, Poland's Polmo factory began producing shock absorbers for domestic use and for export to the Soviet Union for the Lada.57 By 1980, Poland was supplying Lada brake systems to the Soviet Union. Poland also imports a variety of parts (e.g., dashboards) for the Fiat 126p from Hungary (which also cooperates with the Soviet Union in Fiat production), in exchange for assembled Fiat 126p cars.

In 1982, Polish exports of the Fiat 126p to Czechoslovakia were discontinued. However, a trade agreement signed in May 1986 reestablished exports of the 126p, and Poland plans to supply more than 3,000 of them to Czechoslovakia in 1986. In return, Czechoslovakia will export 3,000 Skoda autos, 600 Avia trucks, 500 Tatra trucks, and about 500 other vehicles.58

There are several truck enterprises in Poland. The Lublin truck factory produces the Zuk delivery truck, while the delivery truck factory (PSD) manufactures the 2.5-ton Nysa truck. Heavy trucks are

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56 Piatkowski, 1985.
57 Sobell, 1984, p. 175.
produced at the Starachowice truck factory, which exports Star trucks with either two or three axles and 3.5- to 6-ton cargo capacity.

Buses are produced at two major factories: The Jelcz factory (JZS) manufactures city buses, some models of which are cooperatively produced with Hungary and feature an Ikarus chassis, and the Sanok bus factory, which builds long-distance buses 11 to 12 meters in length. In 1972, Poland purchased Steyr-Daimler-Puch technology for use in Jelcz trucks and Sanok buses; that same year, the government concluded another agreement with Berliet of France for technical assistance, equipment, and components for Jelcz bus production.

The agreement with Berliet proved to be an extremely costly and problematic venture for the Polish government. Due to severe financial problems, Berliet was slow in delivering components and thus delayed bus production. In addition, the bus was not suited for Polish conditions— it was unreliable and required a great deal of maintenance. These problems were never resolved, so Poland turned to Hungary for cooperation in Jelcz bus production. In 1984, a new Ikarus-Jelcz bus appeared on CEMA markets which was jointly created by Polish and Hungarian specialists using the Ikarus chassis.

Poland's truck and bus industries have profited from Western technology. In 1965, Poland bought a license from Leyland (United Kingdom) for the production of Leyland diesel engines for trucks. Poland also purchased the technology to build heavy automotive diesel engines from Henschel (West Germany) in 1966.

Poland participates in a number of cooperation agreements for the production of trucks and buses with Hungary, the USSR, and Czechoslovakia. Poland exports drivers' cabs for trucks and fuel

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59Ibid., p. 53
62Shastitko, 1985, p. 162.
63Edwards and Fraser, 1977, p. 419.
apparatus for diesel engines to Hungary. In return, Poland receives pistons for buses, Raba rear axles, and bus chassis. Poland also imports Tatra trucks from Czechoslovakia.

**Foreign Trade Organizations.** Polish foreign trade is currently carried out by both FTOs and separate enterprises. Trade is conducted in accordance with guidelines laid down by the Ministry of Foreign Trade, which is responsible for the implementation of foreign trade plans and trade policy. FTOs and enterprises act independently, concluding and executing contracts and transactions within the framework of foreign trade plans and trade agreements currently in force with other countries.\(^6\)

Enterprises wishing to conduct foreign trade are required to obtain a general concession from the Ministry of Foreign Trade. Private enterprises as well as state industrial enterprises and cooperative industrial enterprises are eligible to conclude foreign trade contracts.\(^5\)

Despite their high degree of autonomy, the FTOs and enterprises are still subject to the approval of the state organs. The central authorities may influence the decisionmaking process all the way down to the enterprise level.\(^6\)

The foreign trade organization for the motor vehicle industry in Poland is Polmot. This organization handles the export and import arrangements for all motor vehicle commodities. The domestic sales organization for motor vehicles, Polmozbyt, concentrates on domestic sales of passenger cars.

\(^6\) *Manual on Trading with the Socialist Countries of Eastern Europe,* 1985, p. 96.
\(^6\) *Ibid.*
Romania

**Industrial Management.** Romania has a three-tiered system of industrial administration similar to that of the other CEMA countries. The Romanian system consists of the industrial ministry, the industrial centrala, and the enterprise.\(^6^7\)

Motor vehicle production in Romania is supervised by the Ministry of Machine Building Industry. The centralas beneath it include the Pitesti-Colibasi industrial centrala for passenger cars\(^6^8\) and the Brasov industrial automotive centrala for trucks.\(^6^9\)

The industrial centrala is an autonomous economic unit that is coordinated and controlled by the relevant ministry. It is a grouping of several enterprises with its own economic administration. The centrala works out its own economic plan (on the basis of directives received from the state plan).\(^7^0\)

Enterprises possess little economic autonomy themselves; the economic structure is highly centralized. The industrial ministry draws up the draft plan for its branch in accordance with the state plan and coordinates the activities of the centralas under its jurisdiction. Subsequently, the industrial centrala and the enterprises receive detailed plan instructions. Enterprise authority to conclude long-term economic contracts is limited by the fact that such contracts must be based on centrally determined annual plan targets. Enterprises thus concentrate on the details of production, such as scheduling of deliveries, etc.

\(^7^0\)Ibid., p. 65.
Production Capabilities. The development of Romania's motor vehicle industry reflects the government's independence from CEMA.⁷¹ Romania produces a highly diverse assortment of motor vehicles and apparently intends to continue to diversify. For instance, the Brasov truck factory plans to modernize and increase the range of truck tonnages it produces; trucks of 6 to 40 tons are supposed to be manufactured by 1990.⁷²

In addition to diversifying its product lines, Romania's development strategy includes raising the quality and technological performance of its products in order to be competitive in world markets. Romania is attempting to increase its exports, particularly of passenger cars, in an effort to expand its motor vehicle industry.⁷³

Romania's passenger car industry has been built on licenses from French automobile companies. Dacia passenger cars are manufactured under license with Renault. In 1976, Romania and the French company Citroen signed an agreement giving exclusive rights to Romania to produce a new Citroen model, the Olt-Cit. In 1985, Romania produced 134,200 passenger cars, falling short of the 190,000 cars it had planned to produce by the end of that year. In 1986, the production goal was 235,000 cars.⁷⁴

The shortfall in Olt-Cit production is largely due to the fact that much of the production capacity in the Romanian motor vehicle industry has remained idle. Romanian reports indicate that capacity utilization runs only about 60 percent of the industry's total production capacity.⁷⁵ The industry has developed without an adequate assessment of the national capabilities to provide raw materials, energy, and machinery for production.

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⁷⁵Ibid.
Romania has four main industrial enterprises that manufacture passenger cars:

1. The Pitesti-Colibasi enterprise that produces the Dacia under a Renault license.
2. The Craiova and the Timisoara enterprises that produce several passenger cars (mainly the Olt-Cit) under a Citroen license.
3. The Cimpulung-Muscel enterprise that produces the Romanian-designed Aro jeep.  

The "utility vehicle enterprises" within the Brasov industrial automotive centrala produce a wide range of trucks with diesel engines, tractors, dump trucks, containerized vehicles, buses and trolleybuses, and various types of trailers. These enterprises include the Brasov truck enterprise, the Brasov bus factory, Autobuzul in Bucharest, Automecanica in Medias, and the Mirsa mechanical enterprise. The largest truck factory is the Brasov truck enterprise, which produces the Bucelgi model (derived from the Soviet ZIL), as well as the heavy 8- to 10-ton diesel Roman trucks under license with MAN of West Germany.

Buses are produced in Bucharest as well as Brasov. The buses are built on Brasov chassis for domestic and other CEMA markets.

Romania apparently does not participate in any multilateral specialization agreements within the motor vehicle industry. Although Romania attended early CEMA sessions for negotiating cooperation in the industry, such as a meeting at Lvov in 1970, nothing emerged from these talks. Since the Romanian motor vehicle industry is based largely on French and Romanian design, integration with CEMA at this point might be difficult.  

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76Matea, 1985, pp. 5-6.
Nevertheless, Romania is involved in a few bilateral specialization and cooperation agreements within CEMA. Romania currently purchases Raba-MAN motors from Hungary in exchange for castings. In addition, Romania and Bulgaria are cooperating in bus production. Bulgaria and Romania are jointly manufacturing a new 34-passenger bus for city transportation systems, which will be powered by Romania's Roman-Saviem diesel engine.88

Motor vehicle research and development is carried out at the Center for Scientific Research and Technological Engineering, part of the Pitesti-Colibasi centrala, with branches in Cimpulung, Oradea, and Timisoara.81

**Foreign Trade Organizations.** The FTO responsible for the motor vehicle industry in Romania is Autoexportimport. This organization handles Romanian utility vehicles. Some automobile foreign trade occurs through the Auto Dacia Foreign Trade Company, which deals with the vehicles manufactured under French license—the Olt-Cit and the Dacia.82

**USSR**

**Industrial Management.** The branch ministry for the Soviet motor vehicle industry is the Ministry of the Automotive Industry (Minavtoprom), which supervises five production associations and seven all-union industrial associations.83 These units, called the ob'edinenie (association of enterprises), are made up of enterprises manufacturing similar products or affiliated through supply networks. In the motor vehicle industry, the ob'edinenie is headed by the leading enterprise within the group, similar to the East German combinat that is directed by a parent enterprise.

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81Matea, 1985.
83Parker, 1980, pp. 515-541.
The *ob’edinenie* is empowered to delegate plan tasks, to promote specialization, and to issue a wide range of instructions as the hierarchical superior of the production units under its authority. Nove (1981) speculates that, overall, the creation of *ob’edinenie* strengthens the powers of the central organs, Gosplan, and the ministries by reducing the number of units that the upper levels must administer.\(^*\) By taking over the management of day-to-day production, the *ob’edinenie* frees the central *apparat* of the branch ministry to concentrate on formulating an overall development strategy for its industry, improving administrative methods, promoting scientific and technological advance, and resolving the obstacles that impede these goals.\(^**\)

The production associations are AvtoZIL, BelavtoMAZ, KamAZ and AvtoGAZ (which are known for their trucks), and VAZ, the largest producer of Soviet passenger cars. The all-union industrial associations include Soyuzavtopritsep, for specialized vehicles and trailers; Soyuzavtobusprom, for buses; and Soyuzmotoveloprom, for motorcycles and bicycles. The remaining all-union associations specialize in the production of various component parts and heavy machinery.\(^***\)

**Production Capabilities.** The Soviet Union manufactures a broad array of automobiles, trucks, and buses. The volume of total production for these types of vehicles increased significantly between 1970 and 1980, from 916,100 units in 1970 to 2,199,000 in 1980. Unfortunately, a complete set of figures is not available for 1980 to the present. The 1981-1983 data for automobiles and buses indicate that production in motor vehicles declined slightly in the early 1980s (see Tables C.1, C.2, and C.3 in Appendix C).

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\(^***\) Ibid.
According to a Soviet study, this decline can be attributed to the limited construction of both new major motor vehicle factories and new production lines at existing factories (with the exception of the production of a new type of KamAZ). It is also due to increased efforts to modernize the leading factories of the motor vehicle industry for the transfer of production to new basic models of passenger cars, trucks, and buses.**

The Soviet Union's motor vehicle industry has benefited from the infusion of Western technology, in both passenger car and truck production. The principal passenger car exported among the CEMA members is the VAZ-2101 (also known as the Zhiguli and exported under the name Lada). This automobile is a Fiat, constructed under a license purchased in 1966 from Italy and modified to suit Soviet conditions.***

The Fiat license included the design and equipping of a huge automobile plant (VAZ). The cost of the machinery (about $5 billion at the time) was financed under credits provided by the Italian State Bank. The ramifications of this production in the Soviet economy extend beyond the infusion of new technology within the motor vehicle industry. Segal (1977) states that it has also enhanced the Soviet incentive system:

The beauty of the Fiat deal from the Soviet point of view is that not only, according to the foreign minister, Nikolai Patolischev, writing in February 1976, was expenditure on the plant already covered by export sales of the Soviet Fiat . . . but that they had introduced a basic stimulant to their own economy. . . . High on the list of awards for those who win (production and productivity) competitions by increasing output . . . is the right to purchase a new Zhiguli (Lada).****

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**Shastitko, 1985, pp. 155-156.
***Parker, 1980, pp. 515-541.
The Lada is the subject of a large number of cooperation agreements among the CEMA member countries. Since the early 1970s, Hungary has participated in co-production of the Lada, manufacturing a variety of components such as windshield wipers, ignition switches, dashboards, etc., in exchange for assembled Lada cars. By the beginning of the Eleventh Five-Year Plan in 1980, virtually every East European CEMA member was participating in co-production of the Lada. In exchange for assembled cars, Czechoslovakia currently exports Lada headlights and electrical equipment, Poland supplies Lada brake systems and various other components, East Germany exports Lada horns, and Bulgaria and Hungary export many different component parts.

Recent improvements to the Lada are based on Western technology. A new model of the Soviet Zhiguli was scheduled to appear in Western markets in 1986. Its engine was developed by engineers from Porsche. The Kobe steel company and the Komatsu machine company were given contracts amounting to $250 million in November 1985. The Japanese Kawasaki company supplied 22 industrial robots for production assembly. Further contracts are being signed between the Soviet Union and Japanese firms.

In addition to the Lada, the Soviet Union manufactures a variety of other passenger cars for domestic use and export. These include the Moskvitch, the Volga, and the Zaporozhets.

The production of trucks is also an important aspect of the Soviet motor vehicle industry. The major trucks for export include the heavy three-axle diesel trucks built at KamAZ. This factory also manufactures diesel engines for use in other Soviet vehicles, such as the Ural truck, and for buses produced at the Liaz factory and LAZ factory.

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91Stipsicz, 1986, p. 35.
92Parker, 1980, p. 524.
According to Sobell (1984), immediately after the adoption of the Complex Program in 1971, the CEMA Standing Commission on Machine-Building prepared a specialization agreement for the production of heavy trucks. The Soviet Union was directed to concentrate on the production of 6-ton articulated trucks (KamAZ) and giant 27-ton trucks (BelAZ).

Currently, Soviet trucks of various makes are cooperatively produced by most East European CEMA members. The cooperation in trucks occurs under a multilateral specialization agreement signed in 1976 concerning the production of parts and components for the heavy and passenger automotive industry in CEMA. Hungary exports rear axles for many types of Soviet trucks and also supplies horns for KamAZ trucks. The GDR and Czechoslovakia produce headlights for KamAZ trucks, and the Polmo enterprise in Poland supplies the brake systems for a wide variety of trucks. In March 1984, a new contract was signed between the Polmo and Kamaz enterprises extending cooperation in modernizing Polish brake apparatus.

**Foreign Trade Organizations.** Foreign trade in the Soviet motor vehicle industry occurs through an all-union export-import association called Avtoexport. This FTO is a state-owned, independent, self-financing legal entity. Its operations are subject to the approval of the Ministry of Foreign Trade.

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94 Sobell, 1984, p. 177.
95 Ibid.
Soviet FTOs are headed by a director-general who exercises full power and is responsible for all operations. Some of the major functions of the FTO are (1) conclusion and fulfillment of transactions with foreign organizations and firms for the export and import of goods; (2) purchase of import goods for Soviet organizations; and (3) financial settlements with foreign firms and the Soviet economic organizations connected with the import and export of goods. Transactions are carried out on a commission basis.\textsuperscript{99}

The actual purchasing decisions are made by the branch ministries and the enterprises, although the internal production and distribution enterprises do not participate as parties to foreign trade contracts. The FTO acts only as a buying and selling organization on behalf of the enterprises.\textsuperscript{100}

\footnotesize
\textsuperscript{99}Ibid., p. 26.
\textsuperscript{100}Ibid.
Appendix B

MOTOR VEHICLE PRODUCTS EXPORTED UNDER SPECIALIZATION AND COOPERATION AGREEMENTS

<table>
<thead>
<tr>
<th>Participating Countries</th>
<th>Commodities Exported to Partner Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria and</td>
<td></td>
</tr>
<tr>
<td>GDR</td>
<td>GDR: W 50 trucks, semi-trailers with platforms.</td>
</tr>
</tbody>
</table>
Czechoslovakia and

GDR

*GDR:* Recording tachometers for autos, vibration dampers for diesel engines, W 50 trucks, cars (1978), transmissions, engines for cars, wheels, street-cleaning vehicles, isometric truck bodies, semi-trailers with platforms.

*Czechoslovakia:* Avia trucks, disc brakes, street cars, Skoda and Tatra trucks, universal joints, carburetors, garbage trucks, refrigerator semi-trailers.

Hungary


Poland

*Poland:* Zhuk and Nysa delivery trucks (1971), Fiat 125p cars, reflectors and starters for tractors, sparkplugs, brake linings.


Romania

*Romania:* Roman-Diesel trucks, front-wheel drives for heavy vehicles.

*Czechoslovakia:* Gearboxes for UDM buses, Liaz trucks, bearings, Tatra chassis, tow trucks, passenger cars.

USSR


*Czechoslovakia:* Trucks of more than 12-ton load capacity (1971), headlights for Lada cars, Jawa motorcycles, refrigerated semi-trailers, sparkplugs, carburetors (1971).
GDR and

Hungary

*Hungary:* Components for passenger cars, cardan shafts, Ikarus buses and bus bodies (1973), electrical equipment, pistons, chassis for platform vehicles.

*GDR:* Sprung drivers' seats for buses, Trabant and Wartburg cars, cardan shafts, W 50 and Robur trucks, components for Ikarus buses, motors, front and rear axles for medium IK-211 buses, disc brakes for Zhiguli (1973).

Poland

*Poland:* Fiat cars, cement trucks (1974).

*GDR:* Robur trucks, container semi-trailers, axles for trailers (1974), heating equipment.

Romania

*Romania:* Dacia passenger cars.

USSR

*USSR:* KamAZ and BelAZ heavy trucks, passenger cars (1969).


Hungary and

Poland

*Poland:* Fiat 126p (1973), injection pumps, bearings (1966), Fiat 125p, Nysa and Zuk vans (1976), truck cabs, components.


Romania

*Romania:* Castings.

*Hungary:* Raba-MAN motors.

USSR

*USSR:* Zhiguli (Lada) cars (1968), front axle assemblies.

Poland and

Romania

Romania: Dacia passenger cars.

USSR

USSR: Lada, Zaporozhets, Moskvich, and Volga cars (1968); BelAZ and KamAZ trucks, UAZ small-capacity trucks (1975), components for Polski-Fiat.

Poland: Parts for Lada cars, including brake systems and shock absorbers (1968), components for the BelAZ and KamAZ trucks (1975), complete brake systems for trucks, pushbutton switches for Zhuk and Nysa vehicles, diagnostics apparatus.

Romania and

USSR

USSR: Vehicles and lifting-conveying equipment.

Romania: Electric motors, transformers, low-voltage devices, and buses.
Appendix C

MOTOR VEHICLE PRODUCTION AND TRADE
IN THE CEMA COUNTRIES

Table C.1

EAST EUROPEAN AND SOVIET AUTOMOBILE PRODUCTION
(Units)

<table>
<thead>
<tr>
<th>Year</th>
<th>Bulgaria</th>
<th>Czechoslovakia</th>
<th>GDR</th>
<th>Poland</th>
<th>Romania</th>
<th>USSR</th>
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<td>111516</td>
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<tr>
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<td>125517</td>
<td>114611</td>
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<td>2030</td>
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<tr>
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<td>120915</td>
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<td>12668</td>
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<tr>
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<td>128611</td>
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<td>16250</td>
<td>344200</td>
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<td>149016</td>
<td>134265</td>
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<tr>
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<td>154454</td>
<td>139606</td>
<td>89900</td>
<td>28004</td>
<td>730100</td>
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<tr>
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<td>147102</td>
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</table>

SOURCES: Statistical yearbooks: (Hungary) Kuelkereskedelmi Statisztikai Erkeeny; (Soviet Union) Narodnoe khozyaistvo SSSR, Vneshnnaia Torgovlia SSSR: statisticheskii sbornik; (GDR) Statistisches Jahrbuch der Deutschen Demokratischen Republik; (Czechoslovakia) Statisticka Rocenka Ceskoslovenske Socialisticke Republiky; (Poland) Rocznik Statystyczny; (Bulgaria) Statisicheskii Godishnik na Narodna Republika Bulgariya; (Romania) Anuarul Statistic al Republicii Socialiste Romania; various years.
Table C.2

EAST EUROPEAN AND SOVIET TRUCK PRODUCTION
(Units)

<table>
<thead>
<tr>
<th>Year</th>
<th>Bulgaria</th>
<th>Czechoslovakia</th>
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<th>Poland</th>
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<td>23621</td>
<td>2514</td>
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<tr>
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<td>25314</td>
<td>2559</td>
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<td>30535</td>
<td>504500</td>
</tr>
<tr>
<td>1970</td>
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<td>24462</td>
<td>24180</td>
<td>2860</td>
<td>41000</td>
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<tr>
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</tr>
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NOTE: Sources as in Table C.1.
Table C.3

EAST EUROPEAN AND SOVET BUS PRODUCTION
(Units)

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<th>Hungary</th>
<th>Poland</th>
<th>Romania</th>
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<td>13555</td>
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NOTE: Sources as in Table C.1.
### Table C.4

EAST EUROPEAN AND SOVIET AUTOMOBILE EXPORTS TO CEMA
(Percent of national production)

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<thead>
<tr>
<th>Year</th>
<th>Czechoslovakia</th>
<th>GDR</th>
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<th>Romania</th>
<th>USSR</th>
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<td>n.a.</td>
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<td>32.8</td>
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<td>24.7</td>
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<td>48.0</td>
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<td>31.5</td>
<td>21.4</td>
<td>5.3</td>
<td>6.1</td>
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**Sources:** Percentages calculated from Table C.1 and export data in *Kuelkereskedelmi Statisztikai Evkonyv, Vneshniaia Torgovlia SSSR: statisticheskii sbornik, Statistisches Jahrbuch der Deutschen Demokratischen Republik, Statisticka Rocenka Ceskoslovenske Socialisticke Republiky, Rocznik Statystyczny, Anuarul Statistic al Republicii Socialiste Romania;* various years. Data for Bulgaria are not available.
Table C.5

EAST EUROPEAN AND SOVIEIT TRUCK EXPORTS TO CEMA
(Percent of National production)

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<th>USSR</th>
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<td>n.a.</td>
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SOURCES: Table C.2 and statistical yearbooks Vneshniaia Torgovlia SSSR: statisticheskii sbornik, Statistisches Jahrbuch der Deutschen Demokratischen Republik, Statisticka Rocenka Ceskoslovenske Socialisticke Republiky, Rocznik Statystyczny; various years. Data for Bulgaria, Romania, and Hungary are not available.
Table C.6
EAST EUROPEAN AND SOVIET BUS EXPORTS TO CEMA
(Percent of national production)

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SOURCES: Table C.3 and statistical yearbooks listed
Kuekhereskedelmi Statisztikai Evkoeivy, Vneshniaia Torgovlia SSSR: statisticheskii sbornik, Statisticaka Rocenka Ceskoslovenske Socialistiske Republiky, Rocznik Statystyczny; various years. Data for Bulgaria, GDR, and Romania are not available.
Appendix D

STATISTICAL TEST RESULTS: DOES ECONOMIC INTEGRATION INCREASE WITH SPECIALIZATION AGREEMENTS?

Statistical test results of the hypothesis that the share of motor vehicles produced for export to CEMA partners increases after a specialization agreement has been signed are presented in Tables D.1, D.2, and D.3 for automobiles, trucks, and buses, respectively. Test results of the hypothesis that the share of motor vehicles imported from CEMA partners in total consumption increases once an agreement has been signed are presented in Tables D.4, D.5, and D.6 for automobiles, trucks, and buses, respectively.

Our analysis was not exhaustive of all possible bilateral combinations among the CEMA countries because of incomplete data. No tests on export percentages could be made for Romania, and in general, fewer tests could be made on imports as a percentage of consumption than for export percentages. The data extended from 1958 to 1984; however, the data were not always fully available for all years.

In the first three tables, the dependent variable, denoted by the recipient country, is the percentage of motor vehicles exported by the producing country to the recipient (expressed as the arcsin of the square root of the percent divided by 100). In the tables on consumption, it is the percentage of consumption supplied by the partner country (transformed in the same way as production). TIME is an integer variable, negative or positive, which increases by one 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. (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.) Numbers in parentheses are the t-statistics associated with the coefficients above them. The R-squared is unadjusted. Corr(DUMxTIME) 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.
### Table D.1

REGRESSION RESULTS OF AUTOMOBILE EXPORTS AS A PERCENT OF PRODUCTION

<table>
<thead>
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<th>Country Exports to:</th>
<th>Regression Equation</th>
<th>R-square</th>
<th>F Value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
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</thead>
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<td>.1242</td>
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<td>28</td>
<td>.7176</td>
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<td></td>
<td>(16.39) (15.3) (15.61)</td>
<td>(1.649)</td>
<td>(2.81) (1.179)</td>
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<td></td>
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<tr>
<td>PO</td>
<td>BU = .183 - .001 x TIME - .005 x DUM</td>
<td>.2279</td>
<td>3.10</td>
<td>24</td>
<td>.7080</td>
</tr>
<tr>
<td></td>
<td>(13.3) (-.316) (-1.447)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HU = .251 - .001 x TIME - .007 x DUM**</td>
<td>.4162</td>
<td>8.20</td>
<td>26</td>
<td>.8671</td>
</tr>
<tr>
<td></td>
<td>(14.59) (-.292) (-1.777)</td>
<td></td>
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<td></td>
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<tr>
<td>GDR</td>
<td>CZ = .297 + .006 x TIME - .013 x DUM**</td>
<td>.2881</td>
<td>4.25</td>
<td>24</td>
<td>.7277</td>
</tr>
<tr>
<td></td>
<td>(16.45) (-1.63) (-2.81)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>HU = .334 + .013 x TIME - .006 x DUM**</td>
<td>.8417</td>
<td>37.2</td>
<td>17</td>
<td>.4543</td>
</tr>
<tr>
<td></td>
<td>(28.4) (8.24) (-2.14)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU</td>
<td>BU = .22 + .008 x TIME - .013 x DUM**</td>
<td>.4362</td>
<td>9.28</td>
<td>27</td>
<td>.9295</td>
</tr>
<tr>
<td></td>
<td>(18.76) (4.072) (-4.304)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CZ = .206 + .006 x TIME - .011 x DUM**</td>
<td>.3315</td>
<td>5.95</td>
<td>27</td>
<td>.9167</td>
</tr>
<tr>
<td></td>
<td>(14.7) (2.239) (-3.101)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GDR = .283 + .013 x TIME - .0257 x DUM**</td>
<td>.7231</td>
<td>31.34</td>
<td>27</td>
<td>.9295</td>
</tr>
<tr>
<td></td>
<td>(21.4) (5.71) (-7.33)</td>
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</tbody>
</table>

(continued next page)
Table D.1 (continued)

<table>
<thead>
<tr>
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<th>Coefficient</th>
<th>T-stat</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUM\times TIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HU = .172</td>
<td>+ .003 x TIME - .003 x DUM</td>
<td>(17.65) (1.78) (-1.25)</td>
<td>.1538</td>
<td>2.18</td>
<td>27</td>
<td>.9295</td>
</tr>
<tr>
<td>PO = .106</td>
<td>- .004 x TIME + .002 x DUM</td>
<td>(17.1) (-3.458) (1.219)</td>
<td>.6319</td>
<td>20.6</td>
<td>27</td>
<td>.9295</td>
</tr>
</tbody>
</table>
### Table D.2

REGRESSION RESULTS OF TRUCK EXPORTS AS A PERCENT OF PRODUCTION

#### CZ exports to:

<table>
<thead>
<tr>
<th></th>
<th>PO</th>
<th>SU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.267 + .005 x TIME - .008 x DUM</td>
<td>.120 - .02 x TIME + .037 x DUM*</td>
</tr>
<tr>
<td></td>
<td>(11.6) (1.30) (-1.43)</td>
<td>(9.60) (-6.085) (7.062)</td>
</tr>
<tr>
<td>R-square</td>
<td>.0757</td>
<td>.6687</td>
</tr>
<tr>
<td>F</td>
<td>1.02</td>
<td>25.23</td>
</tr>
<tr>
<td>Observations</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Corr(DUMxTIME)</td>
<td>.9075</td>
<td>.9075</td>
</tr>
</tbody>
</table>

#### GDR exports to:

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>PO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.232 + .005 x TIME - .003 x DUM</td>
<td>.210 + .012 x TIME - .007 x DUM*</td>
</tr>
<tr>
<td></td>
<td>(18.0) (2.62) (-.873)</td>
<td>(18.2) (4.97) (-2.33)</td>
</tr>
<tr>
<td>R-square</td>
<td>.3829</td>
<td>.6486</td>
</tr>
<tr>
<td>F</td>
<td>7.13</td>
<td>19.38</td>
</tr>
<tr>
<td>Observations</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>Corr(DUMxTIME)</td>
<td>.8620</td>
<td>.7870</td>
</tr>
</tbody>
</table>

#### PO exports to:

<table>
<thead>
<tr>
<th></th>
<th>HU</th>
<th>SU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.210 + .012 x TIME - .007 x DUM*</td>
<td>.193 + .030 x TIME - .021 x DUM</td>
</tr>
<tr>
<td></td>
<td>(18.2) (4.97) (-2.33)</td>
<td>(4.4) (2.18) (-1.70)</td>
</tr>
<tr>
<td>R-square</td>
<td>.6486</td>
<td>.2889</td>
</tr>
<tr>
<td>F</td>
<td>19.38</td>
<td>2.84</td>
</tr>
<tr>
<td>Observations</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Corr(DUMxTIME)</td>
<td>.7870</td>
<td>.8620</td>
</tr>
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#### SU exports to:

<table>
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<tr>
<th></th>
<th>BU</th>
<th>PO</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>.094 - .001 x TIME - .002 x DUM</td>
<td>.069 + .004 x TIME - .0014 x DUM</td>
</tr>
<tr>
<td></td>
<td>(12.8) (-.873) (-.65)</td>
<td>(13.65) (4.499) (-.941)</td>
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<tr>
<td>R-square</td>
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<td>.6102</td>
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<td>F</td>
<td>3.34</td>
<td>15.66</td>
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<tr>
<td>Observations</td>
<td>19</td>
<td>23</td>
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<tr>
<td>Corr(DUMxTIME)</td>
<td>.936</td>
<td>.856</td>
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Table D.3
REGRESSION RESULTS OF BUS EXPORTS AS A PERCENT OF PRODUCTION

<table>
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<th>Coefficient</th>
<th>Time Coefficient</th>
<th>DUM Coefficient</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CZ exports to:</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>HU</td>
<td>0.042</td>
<td>0.006</td>
<td>-0.009</td>
<td>0.3654</td>
<td>7.20</td>
<td>28</td>
<td>0.7604</td>
</tr>
<tr>
<td></td>
<td>(3.94)</td>
<td>(3.49)</td>
<td>(-3.62)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO</td>
<td>0.081</td>
<td>-0.018</td>
<td>0.011</td>
<td>0.3437</td>
<td>6.54</td>
<td>28</td>
<td>0.8546</td>
</tr>
<tr>
<td></td>
<td>(2.00)</td>
<td>(-2.70)</td>
<td>(1.06)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HU exports to:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BU</td>
<td>0.146</td>
<td>0.002</td>
<td>0.0005</td>
<td>0.0973</td>
<td>1.29</td>
<td>27</td>
<td>0.537</td>
</tr>
<tr>
<td></td>
<td>(14.296)</td>
<td>(-1.45)</td>
<td>(0.190)</td>
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<td></td>
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</tr>
<tr>
<td>GDR</td>
<td>0.50</td>
<td>-0.012</td>
<td>-0.007</td>
<td>0.9060</td>
<td>120.47</td>
<td>28</td>
<td>0.894</td>
</tr>
<tr>
<td></td>
<td>(34.78)</td>
<td>(-5.10)</td>
<td>(-2.00)</td>
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</tr>
<tr>
<td>SU</td>
<td>0.716</td>
<td>0.037</td>
<td>-0.031</td>
<td>0.5121</td>
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<td>28</td>
<td>0.907</td>
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<tr>
<td></td>
<td>(11.7)</td>
<td>(3.79)</td>
<td>(-1.99)</td>
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Table D.4
REGRESSION RESULTS OF AUTOMOBILE IMPORTS
AS A PERCENT OF CONSUMPTION

**BU imports from:**

<table>
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<tr>
<th>Variable</th>
<th>Coefficient 1</th>
<th>Coefficient 2</th>
<th>Coefficient 3</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZ</td>
<td>.170</td>
<td>-.0185</td>
<td>.023</td>
<td>.4671</td>
<td>9.20</td>
<td>24</td>
<td>.8578</td>
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<tr>
<td></td>
<td>(7.717)</td>
<td>(-4.285)</td>
<td>(3.78)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO</td>
<td>.251</td>
<td>-.005</td>
<td>.000</td>
<td>.1360</td>
<td>1.65</td>
<td>24</td>
<td>.7493</td>
</tr>
<tr>
<td></td>
<td>(9.88)</td>
<td>(-1.20)</td>
<td>(.007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU</td>
<td>.95</td>
<td>.008</td>
<td>-.012</td>
<td>.0261</td>
<td>.30</td>
<td>25</td>
<td>.9278</td>
</tr>
<tr>
<td></td>
<td>(16.6)</td>
<td>(.768)</td>
<td>(-.725)</td>
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<td></td>
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</table>

**CZ imports from:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient 1</th>
<th>Coefficient 2</th>
<th>Coefficient 3</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDR</td>
<td>.325</td>
<td>-.002</td>
<td>-.004</td>
<td>.2098</td>
<td>3.05</td>
<td>26</td>
<td>.7383</td>
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<tr>
<td></td>
<td>(19.8)</td>
<td>(-.804)</td>
<td>(-.982)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU</td>
<td>.442</td>
<td>.011</td>
<td>-.014</td>
<td>.0938</td>
<td>1.19</td>
<td>26</td>
<td>.9175</td>
</tr>
<tr>
<td></td>
<td>(9.70)</td>
<td>(1.44)</td>
<td>(-1.11)</td>
<td></td>
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</tr>
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</table>

**GDR imports from:**

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Coefficient 3</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZ</td>
<td>.342</td>
<td>.0002</td>
<td>-.005</td>
<td>.0713</td>
<td>0.81</td>
<td>24</td>
<td>.7493</td>
</tr>
<tr>
<td></td>
<td>(14.8)</td>
<td>(.055)</td>
<td>(-.871)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>SU</td>
<td>.601</td>
<td>.047</td>
<td>-.063</td>
<td>.5574</td>
<td>13.22</td>
<td>24</td>
<td>.9278</td>
</tr>
<tr>
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<td>(13.9)</td>
<td>(5.138)</td>
<td>(-4.87)</td>
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<td></td>
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**HU imports from:**

<table>
<thead>
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<th>Coefficient 2</th>
<th>Coefficient 3</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>.284</td>
<td>-.014</td>
<td>.012</td>
<td>.4067</td>
<td>8.23</td>
<td>27</td>
<td>.8813</td>
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<tr>
<td></td>
<td>(8.7)</td>
<td>(-3.22)</td>
<td>(1.69)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SU</td>
<td>.604</td>
<td>.005</td>
<td>.009</td>
<td>.0269</td>
<td>0.35</td>
<td>28</td>
<td>.8987</td>
</tr>
<tr>
<td></td>
<td>(13.8)</td>
<td>(-.748)</td>
<td>(.831)</td>
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**PO imports from:**

<table>
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<th>Coefficient 3</th>
<th>R-square</th>
<th>F-value</th>
<th>Observations</th>
<th>Corr(DUMxTIME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU</td>
<td>.262</td>
<td>-.013</td>
<td>.007</td>
<td>.7591</td>
<td>37.82</td>
<td>27</td>
<td>.9278</td>
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<td></td>
<td>(17.5)</td>
<td>(-5.29)</td>
<td>(1.91)</td>
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<td></td>
<td></td>
<td></td>
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</table>
Table D.5
REGRESSION RESULTS OF TRUCK IMPORTS
AS A PERCENT OF CONSUMPTION

CZ imports from:
\[
\begin{align*}
PO &= .301 + .010 \times \text{TIME} - .040 \times \text{DUM}^{**} \\
(6.21) &\quad (1.23) &\quad (-3.00)
\end{align*}
\]
R-square = .5075  F = 11.85  Observations = 26  Corr(DUMxTIME) = .8827

GDR imports from:
\[
\begin{align*}
PO &= .053 + .008 \times \text{TIME} + .004 \times \text{DUM} \\
(1.81) &\quad (0.48) &\quad (1.31)
\end{align*}
\]
R-square = .3984  F = 6.95  Observations = 24  Corr(DUMxTIME) = .8827

PO imports from:
\[
\begin{align*}
\text{CZ} &= .192 + .000 \times \text{TIME} + .002 \times \text{DUM} \\
(10.6) &\quad (.095) &\quad (.384)
\end{align*}
\]
R-square = .0390  F = 0.53  Observations = 29  Corr(DUMxTIME) = .8889

\[
\begin{align*}
\text{SU} &= .284 + .014 \times \text{TIME} - .017 \times \text{DUM}^{**} \\
(9.51) &\quad (2.80) &\quad (-2.21)
\end{align*}
\]
R-square = .2481  F = 3.96  Observations = 27  Corr(DUMxTIME) = .8167

SU imports from:
\[
\begin{align*}
\text{CZ} &= .038 - .002 \times \text{TIME} + .006 \times \text{DUM}^{*} \\
(14.3) &\quad (-1.98) &\quad (5.06)
\end{align*}
\]
R-square = .8706  F = 50.48  Observations = 18  Corr(DUMxTIME) = .9465

\[
\begin{align*}
PO &= .051 + .009 \times \text{TIME} - .007 \times \text{DUM} \\
(8.51) &\quad (5.09) &\quad (-2.98)
\end{align*}
\]
R-square = .6783  F = 15.81  Observations = 18  Corr(DUMxTIME) = .8395
Table D.6

REGRESSION RESULTS OF BUS IMPORTS
AS A PERCENT OF CONSUMPTION

<table>
<thead>
<tr>
<th>BU imports from:</th>
<th>HU = 0.486 - 0.033 x TIME + 0.019 x DUM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(7.21) (-3.34) (.997)</td>
</tr>
<tr>
<td>R-square</td>
<td>.3560</td>
</tr>
<tr>
<td>F</td>
<td>5.81</td>
</tr>
<tr>
<td>Observations</td>
<td>24</td>
</tr>
<tr>
<td>Corr(DUMxTIME)</td>
<td>.4707</td>
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</table>

<table>
<thead>
<tr>
<th>GDR imports from:</th>
<th>HU = 0.721 - 0.042 x TIME + 0.029 x DUM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(12.6) (-2.75) (1.52)</td>
</tr>
<tr>
<td>R-square</td>
<td>.4508</td>
</tr>
<tr>
<td>F</td>
<td>6.98</td>
</tr>
<tr>
<td>Observations</td>
<td>20</td>
</tr>
<tr>
<td>Corr(DUMxTIME)</td>
<td>.9025</td>
</tr>
</tbody>
</table>
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