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Abstract

Institutional Decentralization and Regional Economic Integration in Yugoslavia, 1970–1987

Kori Udovički

1999

We analyze the institutions of the politico-economic system established at the turn of the decade of the 1970s and look for evidence of their negative effect on regional economic integration as reflected by a data set on intra- and inter-regional trade in Yugoslavia over 1970–1987. Through an illustrative model we first explore the relationship of regional production specialization and economic integration. As there were no explicit obstacles to inter-regional trade in former Yugoslavia, we look for sources of disintegration in the setup of the economic decision making system. We expect market forces—which played a principal role in the day-to-day make/buy decisions of firms—to have had an integrative effect, but identify characteristics and constraints of the system which would have been disintegrative even with rationally behaving economic agents and policy-makers. Next, we look for evidence of disintegration in an econometric analysis of the determinants of intra- versus inter-regional flows. Of the factors found to determine the trade flows—seller-region capital and labour, buyer region disposable income, foreign import prices, and an

unidentified trend—only seller-region capital contributed significantly more to intra- than to inter-regional flows. Finally, we measure regional production specialization at a two-digit and detailed (650 industries) industrial classification and find evidence of despecialization. We look for evidence of regional import-substitution by testing for a positive association between regional specialization and inter-regional trade. The findings show unambiguous import-substitution only in less-developed regions' purchases from more developed regions. However, contrary to expectations, the results show a general negative association between specialization and inter-regional trade, suggesting that economic agents made the most of the production structures in place through the pursuit of intra-industry specialization. Overall, the evidence suggests that the national economy was segmented along regional lines, but there is no support for the view that the segmentation increased over time or that regions pursued economic self-sufficiency relative to one another.

Institutional Decentralization and Regional Economic Integration in Yugoslavia, 1970–1987

A Dissertation
Presented to the Faculty of the Graduate School
of
Yale University
in Candidacy for the Degree of
Doctor of Philosophy

by
Kori Udovički

Dissertation Director: T. N. Srinivasan
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To All the Victims of Yugoslavia's Disintegration

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Many of the data used in this study are unpublished and have not, to my knowledge, been used in any other studies. They have been made accessible to me largely through the efforts of several people in the Federal Bureau of Statistics or other data collection agencies in the early 1990s who showed interest and goodwill beyond the call of duty. I am particularly grateful to Ljubiša Kedžić, Deputy Director of the Bureau, Slobodan Vučković, in charge of external sector data at the Bureau, Vesna Djidara, computer systems analyst at the Bureau, and Mira Zarić, researcher at the Institute of Transportation of Belgrade.

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Finally, I wish to note that my original intention had been to dedicate this work to my parents as a token payback for so much that I owe to them. I am sure that my father would have been, and my mother will be, glad to share the dedication with others to whom the demise of Yugoslavia has caused great pain.

The responsibility for any errors and omissions remaining in this study is solely mine.

ABBREVIATIONS

BOAL	Basic organization of associated labour
COAL	Composite organization of associated labour
FAD	Fund for the Accelerated Development of the Insufficiently Developed Republics and Kosovo
GMP	Gross Materia Product (see Appendix III).
LCY	League of Communists of Yugoslavia
ROC	Rest of the country
ROW	Rest of the World
SAS	Social Accountancy Service
SGJ	*Statisticki godisnak Jugoslavije*—Statistical Yearbook of Yugoslavia
SIC	Self-managed interest community
SIF	Social investment fund
SPC	Socio-political community
SUR	Seemingly unrelated regressions
SZS	*Svezni zavod za statistiku* - Federal Bureau of Statistics
WO	Work organization of associated labour

CHAPTER ONE

INTRODUCTION

The economy of former Yugoslavia attracted considerable attention from Western economists as a testing ground for models of market socialism and labor ownership. Issues of regional development also attracted attention because the differences in levels of development among the country's regions were unmatched by any other country in Europe. Yet, the issues of inter-regional economic relations have not attracted the attention of economists in the West. This omission is surprising. In the public consciousness of former Yugoslavia, as well as among its economists, inter-regional economic relations were of the utmost importance. Moreover, western political scientists and historians have shown that regional political economic forces crucially affected the evolution and articulation of the former-Yugoslav economic system.

A growing public obsession with regional economic relations led to the creation of what might be called regional economic mythologies and fed into feelings of inequality and victimization in the regional communities. The feelings came in waves preceding institutional changes that invariably brought further decentralization. The last such wave preceded the country's bloody demise in the early 1990's. A review of the press in the late

1980's is illustrative of how these mythologies assumed a life of their own and served as an important "rationale" for nationalist forces.[1]

The two most prominent themes were the "exploitation" of one region by the others and the disintegration of the national market. The research to lend support to the "economic facts" underlying such regional mythologies was scant, one-sided and often methodologically seriously flawed.[2] What is more, although voices of reason could be heard and although a few prominent economists clearly understood the issues, we are unaware of any attempt to list, let alone quantify, all the sources of both costs and benefits to a region from participation in the former-Yugoslav federation.

Similarly, increasing economic disintegration was treated as a fact by the public, government and most of the academic community. The only hard figures given to support the allegations, however, were methodologically flawed trade indicators (discussed in Chapter Four). J. Burkett and B. Škegro (1987) represent the single more comprehensive attempt to test for Yugoslav regional economic disintegration in Yugoslavia or abroad. They test whether a significant trend can be detected over the period 1963–1984 in three

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[1]As an example of how misinformation attained a life of its own, we can point to a series of articles in the Serbian press: *Ekspres Politika* 12/22/88, *Ekspres Politika* 12/26/88 and *Borba* 12/30/8. The first article, in a front-line daily of Milošević's nationalistic campaign, claims that the Slovenian market is so closed to Serbian firms, that no Serbian shoes whatsoever make it to Slovenia. The second, in the same paper, is a rebuttal by a Belgrade manufacturer of shoes that states it has sold 250 thousand pairs of shoes in Slovenia from January to November of the current year. The third article, in a daily opposed to nationalism and with a Yugoslav-wide view, deplores the gradual disintegration of the country and cites as an example that shoes made in Serbia are no longer being sold in Slovenia.

[2]See I. Lavrač (1988) and R. Bukvić and B. Hinić (1989) as examples of two ambitious but one-sided analyses of the positions of Slovenia and Serbia in the Yugoslav Federation. The first disregards the important issue of regional terms of trade; the second, focusing on terms of trade, simply does not take into account that the composition of inter-regional trade, not production, affects the losses incurred through terms of trade. See also the devastating criticism in M. Bazler-Madžar (1989) of the methodological flaws in Č. Ocić (1988).

indicators: price dispersion of five homogeneous products, an index of regional specialization in the production of 22 tradable commodities at the 2-digit level of aggregation, and personal income dispersion. They conclude that the indicators reflect low levels of integration, but that a statistically significant trend cannot be detected. E. Kraft (1989) also looks at the evolution of regional industrial structures in 1966-1982, and finds that there is a significant despecialization in regional production patterns for 19 2-digit industrial products. The difference between the conclusions of these two studies is explained by the fact that Burkett and Škegro include agricultural products in the structure of production, and Kraft does not.

These two studies rest on the assumption that regional despecialization necessarily reflects disintegration. Burkett and Škegro look at other indicators as well, but their findings in this regard, although interesting, are of limited scope.

Three more analysis of inter-regional economic relations are worth mentioning. Lj. Tatarević (1985) and M. Momirska-Marjanović (1991), each constructed a two-regional input-output table for, respectively, Serbia and the rest of the country, and the two sets of developed and under-developed regions in the country.[3] I. Lavrač (1980), is a multiregional econometric model for projection of regional development. All three studies are estimates of inter-regional and inter-sectoral relations at a point in time. In principle, they could be used to compare the regional integration in Yugoslavia with that of other countries. Unfortunately, studies of within-national inter-regional economic flows are rare. Data on

[3]For a description of the former Yugoslav regions, and in particular the definition of developed and under-developed regions, see Appendix I.

within-national economic flows usually do not exist, so the estimation of the flows represents an undertaking in itself.[4]

The Yugoslav case is special as a data set on inter-regional trade exists, with eight observations of each bilateral flow over the period 1970–1987. This period begins approximately at the time of the regionalization of the political institutions that was blamed by many for the alleged progressive economic disintegration of the country and ends little before the time of the final dissolution of the country. In this study we analyze the politico-economic system established at the turn of the decade of the 1970s, and build econometric models for the analysis of the trade data set that allow us to test if, indeed, these institutions led to the progressive economic disintegration over the subsequent eighteen years.

We focus entirely on economic integration as manifested by the flow of goods and services. An analysis of the mobility of capital and labor are absent for two reasons. Factor mobility in Yugoslavia was extremely low, both within and across regional borders, so the lack of integration in factor markets is a foregone conclusion. Spontaneous capital movement across regional borders—such as enterprise or bank investment in projects across regional borders—did not surpass 1 percent of total annual investment in the period of the analysis. In the ten years from 1971 to 1981, only 2.5 percent of the total population moved between regions. Of the population that did move, one-third moved from Bosnia-Herzegovina, the only region without a republican ethnic identity. Inter-regional mobility was about three

[4]K. Polenske (1980), discussed in Chapter Four, is one such estimate of flows among the nine U.S. census regions.

times smaller than mobility out of the country in 1965–1975 and ten times smaller than for intra-regional mobility (M. Bevc, 1988).

The second reason for their omission is that conceptually and methodologically, the relationship of factor mobility to economic integration differs substantially from that of goods mobility. Traditional studies of economic integration among national economies often assume the absence of factor mobility and focus on goods mobility alone for this reason. We do treat the institutional factors that led to capital immobility as they lie at the root of our analysis of goods mobility. However, labor mobility was affected by a separate complex of factors—cultural factors, political institutions and aspects of the institutional set-up of the labor-managed firm—that do not bear directly on our analysis of trade. The relations of labor-management discouraged wage competition. Therefore, a process whereby migration from under-developed to the developed regions would be prompted by the interest of enterprises in the more developed regions to hire cheaper labor was precluded from developing. This is an interesting set of issues and of great importance to the feedback that economic integration can have on political and cultural institutions, but it falls outside the scope of our analysis. The analytical assumption underlying the trade models in this study is that factors were immobile across regional borders.

The concept of economic integration gauged in this study corresponds to the usage frequently encountered in history literature, or non-rigorous economic discourse, such as when references are made, for example, to the "integration of the U.S. national market" in the late XIX century. Loosely speaking, the economic integration of a geographic area refers to the number and size of economic transactions, particularly trade, executed among agents

located in different locations within that area. This concept is broader than the one typically used in traditional economics, and which refers to the efficient and unobstructed operation of markets in a multilocational context.

Traditional economics considers that markets are integrated when, given certain transportation costs and the time that it takes to transport goods from one geographic point to another, prices of goods at different locations do not differ by more than the cost of transportation between the locations. In the traditional paradigm the specialization in production that leads to regional trade depends on their respective endowments, tastes and technologies. The extent of optimal specialization, and therefore of the optimal level of trade, is given by the economies' initial conditions (factor endowments). If the endowments, technologies and tastes in two economies are the same, there will be no gains from trade, and consequently no trade. Moreover, trade levels *per se* are irrelevant. As long as the signals that lead market forces to the correct pattern of specialization are correctly perceived, that is, as long as there are no obstacles to trade, the resulting levels of trade (high, low, or none) will be optimal. To distinguish this understanding of integration commonly encountered in the traditional literature from the understanding used in this study, we will refer to it as "market integration."

The concept of "market integration" is not central to regional integration in former Yugoslavia because of two reasons. First, the importance of the geographic dimension of market integration pales in comparison with the fact that markets were not well integrated, regardless of their geographic distribution. The operation of forces leading to price equalization were obstructed at the level of micro-economic decision making and market

intermediation and it is questionable how relevant was price equalization to regional integration. Second, there were no explicit barriers to the flow of goods or factors across regional borders, such as tariffs or capital controls. Traditional economics typically identifies disintegration with such explicit and measurable obstacles to economic flows and in most countries the tax system would have been a prime suspect as the cause of regional disintegration. In former Yugoslavia tax discrimination by regional origin of the goods was forbidden.[5] Obstacles to trade were imbedded in the set-up of the decision making process, and not quantifiable.

We analyze a second-best world, focusing on the ultimate outcome of integration/ disintegration—the level of flows among the regions and the distribution of economic activities between and within them. We start from the premise that an optimal level of regional specialization is not given by initial conditions. Instead, a range of outcomes can result under the influence of numerous, often incidental, factors. From a pure economic welfare point of view, these outcomes may be indifferent. However, if "integration" in this sense does not necessarily matter from a welfare point of view, it does, in our view, matter for political and cultural institutions. The higher the interdependence, the number of interactions, between two regions, the more likely it is that cultural and political differences between the regions may be overcome.

Such a concept of integration is better treated in the context of the "new international trade" and "new economic geography" paradigms, which are based on the assumption that

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[5]The tax system was so ideologically loaded and complex that we cannot speak of the conduct of tax policy or any systematic effect of taxation. We, therefore, leave the tax system aside.

specialization in production is the result of lumpy technologies and production in the region of increasing returns to scale (IRS). In the presence of IRS, concentration of particular industries in single (or a limited number of) locations allows for greater productivity than if all goods are produced in all locations.

In the next chapter we present, through an illustrative model, how chance and numerous incremental considerations—considerations that do not lend themselves easily to generalization for analytical purposes—may affect regional industrial allocation.[6] This matters because, where chance and the accumulation of incidental factors can substantially affect economic outcomes, the effect that social and political institutions have on these outcomes can easily be significant, as well. We also use this model to illustrate how economic integration affects the interdependence among agents of different regions and is likely to have a feedback on political and social institutions as well.

In our institutional analysis we take the point of view that market forces, which have an essentially integrative effect, played a very important, possibly predominant, role in the economic life of Yugoslavia in the 1970s and 1980s. However, there are several aspects of the economic decision-making process, generally linked to its non-market components, that are likely to have played a disintegrative role as well. The third chapter of this study focuses on the identification of these institutional cleavages. While we concede that the willful pursuit of import-substitution and autarkic behavior was institutionally possible, we argue that the motivations and constraints faced by decision-makers was unlikely to render such

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[6]The Yugoslavs referred to this complementary regional allocation of industries as "regional division of labor."

a possibility of much importance. Instead, we point to system characteristics and circumstances under which a highly territorialized process of investment decision-making—such as was present in Yugoslavia—would have been disintegrative even if the agents behaved rationally.

On the basis of the institutional analysis alone we can conclude that the Yugoslav regions were probably less integrated than they would have been with a more centralized political system or with the unobstructed operation of market forces. However, the extent to which the institutions of the period of our analysis led to progressive economic disintegration, that is, whether the disintegrative effects of the institutional set-up outweighed the integrative effect of market forces, is an empirical question. Chapters Four, Five and Six focus on the empirical analysis of inter-regional trade.

Chapter Four introduces the empirical analysis through an overview of the regional trade data on which the present study is based against the backdrop of trade levels observed in other regions and countries of comparable size. It also gives a generic model of regional trade determination under standard assumptions about market structure and technology that represents the base from which the models in the subsequent two chapters are derived.

Chapter Five adapts the generic model described in Chapter Four to incorporate some non-standard features of the Yugoslav economy and to test whether the determinants of intra- and inter-regional trade differed in a manner consistent with what would have been expected in the presence of institutional obstacles to trade. The analysis shows that the process of capital formation was unambiguously biased in favor of intra-regional as against inter-regional trade. However, the difference in the effect on inter- and intra- regional trade of all

other factors included in the analysis—buyer region income, labor employed in the supplier region, import prices and a time trend—is not found to be statistically significant.

Chapter Six asks if the bias in capital formation might have been a reflection of generalized import-substitution by regions from one another. This, in our view, would have lent strong support to the view that economic disintegration in former Yugoslavia was the result of the deliberate pursuit of autarkic economic structures by regional policy-makers. We find, however, unambiguous evidence of import-substitution only in purchases by under-developed from developed regions which, alone, might have been the result of a normal development process.[7] Finally, Chapter Seven gives the conclusions of our analysis.

A normalization of relations among the successor countries of former Yugoslavia will inevitably be accompanied by the intensification of economic relations among them. This study is a contribution to the demystification of their earlier economic relations. Without a thorough demystification, the risk of re-igniting economic nationalism will not subside. An economic interest in preserving political integration cannot alone be the cure for nationalist hostility. Nevertheless, there are examples—such as Quebec, where the notion that secession would be costly has been an important factor in keeping its secessionist spirits at bay—that the public perception of inter-regional economic relations can make a difference in the endeavor to maintain good inter-ethnic relations.

While our analysis is carried out entirely on the rather peculiar case of the former Yugoslav economy, the findings as well as the methods we apply have a more general

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[7]For a description of the former Yugoslav regions, as well as the definition of more and less developed regions see Appendix I.

relevance. The institutions that segmented the Yugoslav national market are present to some degree within other economies as well. Parallels can be even more rightfully drawn with respect to associations of national economies, such as the European Union, which the former Yugoslav regions resembled in many respects. Our results underscore the importance that the operation of market forces has to economic integration. And economic integration is important, we believe, because of the feedback it can have on social and political integration.

CHAPTER TWO

ECONOMIC INTEGRATION AND IRS

2.1 The Basic Model

Consider a closed economy, in which labour is the only factor of production, there are no transportation costs and the available technology consists of a universe of I industries. The industries are defined so that each one of them represents one step in a vertical process of production. Only the Ith industry produces a consumption good, while only industry 1 does not require intermediate inputs from any other industry. The remaining I–2 industries can be ordered in an array where industry i buys all intermediate inputs from industry i–1 while its good is the input for industry i+1. Denote with ℓ^e_i the labour needed to produce x^e_i units of industry i's product by an enterprise. Assume, for simplicity, that the functional form of the labour requirement for all industries is the same, that is, that the labour required to produce a unit of industry i's output by one enterprise is given by:

(2.1) $\ell^e_i = \alpha + \beta x^e_i$

Assume for the time being that the fixed cost α is enterprise specific. That is, an additional unit of output of good i if produced by an established enterprise requires β labour, but production by a new enterprise requires first the expenditure of the fixed cost α.

Further, assume that the requirement for the intermediate input in industries 2, 3, . . *I*, is of the Leontief form, that is, that a given and only that given amount of intermediate input is needed to produce a unit of any good other than 1. Assume, for simplicity, that for all industries the per-unit intermediate input requirement is 1. In that case the production function for all products other than product 1 is of the form

(2.2) $x^e_i = \min(a^e_{(i-1)}, (\ell^e_i - \alpha)/\beta) \qquad i = 2, 3 \ldots I$

where $a^e_{(i-1)}$ stands for the number of units of product $(i-1)$ used in the production of product i. The production function for product 1 is simply equation (2.1).

Clearly, under the standard assumptions about the behaviour of capitalist enterprises, in equilibrium in this economy there will be only one enterprise per industry, that is, $x^e_i = x_i$ and $\ell^e_i = \ell_i$ where x_i and ℓ_i are respectively the economy's total output of good i and total labor employed in producing it. Moreover, $x_1 = x_2 = \ldots x_I = x$ and $\ell_1 = \ell_2 = \ldots \ell_I = \ell$. Assume that total labour supply equals L. Then

(2.3) $x = (L - I\alpha)/I\beta.$

Although equilibrium sustains only one enterprise per industry, if entry is costless this can be thought of as a competitive economy and profits will be driven to zero. For example, consider the case that the enterprise in industry i increases its price above average costs. Immediately, a new entrant would offer the same supply at only a slightly lower price, that is, taking a slight cut in profits. At the same time, in order for resources to be driven away from some other industry, wages would have to rise in industry i, further reducing profits. As long as there are profits, however, there will be new entrants undercutting them, until profits are reduced to zero. Eventually, the only equilibrium situation is one where

wages are equalized, profits have been driven to zero and product prices equal average costs. The price of a product, or average costs, will depend on the product's place in the chain of production:

(2.4) $p_i = iw\,\ell/x.$

where w denotes the wage. If wages are set to 1 and it is assumed that workers are the only consumers, then $p_I = L/x$ and $c = x/L$ where c is the consumption of the representative individual.

Further, it is of interest to note that, owing to the existence of intermediate production, the value added of an industry w $\ell = \ell$ differs from the value of that industries' gross output, GO_i. While value added in all industries will be the same because production functions and output levels are identical, the value of gross output will depend on the industry's place in the chain of production

(2.5) $GO_i = p_i x_i = i\ell.$

The aggregate value of the product of this economy is given by GDP = GNP = ℓI = L, while the aggregate gross output, GO, obtained after rearranging the summation of GO_i over all i is given by

(2.6) $GO = L\,(I + 1)/2$

2.2 Two Examples of Integration in a Two-Region Case

Now, to explore the implications of regional industrial allocation, assume, first, that the described economy consists of two regions. Assume, further, for simplicity, that they are

of equal size, (measured by population) and that I is an even number.[8] In equilibrium, one-half of all the industries will be located in each region, there will be only one enterprise in each industry, and wages and the value added in the two regions will be equalized. As long as it is assumed that there are no transportation costs or any other features that differentiate the regions, the particular regional distribution of industries will be indeterminate and completely irrelevant to welfare. However, each regional allocation of industries will have different implications for the level of equilibrium inter-regional and intra-regional trade.

We consider two cases: one, call it "inter-regional integration" (IRI), in which the inter-regional trade to output ratio is highest; and another, call it "within-regional integration, (WRI)" in which the ratio is lowest. IRI results if all odd numbered industries are located in one region, say Region 1, and all even-numbered industries are in the other, Region 2. In that case, each industry (other than I) sells its output to an industry located in the fellow region and the entire output of Region 1 will be sold in inter-regional trade (none in intra-regional trade). Region 2 will sell to region 1 every product it makes with the exception of one-half of the output of industry I, which it will sell to its own consumers. Intra-regional trade in Region 2 will amount to one half of the value of output of industry I. Denote the sales of region h to region j by T_{hj}, the value of gross output of region h with GO_h, and the ratio T_{hj}/GO_h with t_{hj}. Then it can be shown that in

[8]In these models, labour has to be immobile to give space a dimension. However, if regional labour forces are not an exact multiple of L/I, this complicates the model, opening up the possibility that there will be more than one enterprise producing the same good, and wages will differ across the two regions. This is a consequence of the technological restrictiveness assumed in the model, and opens questions not directly relevant to the issues explored here. The present analysis could more readily be extended to I odd, in which case the labour forces of the two regions would have to differ, but this, too, is an unnecessary complication.

IRI:

(2.7) $GO_1 = T_{12} = \ell\,(I/2)^2$ $\quad t_{12} = 1$, $t_{11} = 0$

while

(2.8) $GO_2 = \ell(I/2)\,(I/2 + 1)$ $\quad T_{21} = \ell\,(I/2)^2$, $t_{21} = (I/2)/(I/2 + 1)$, $T_{22} = \ell I/2$, $t_{22} = [1/(I/2 + 1)]$.

Note that trade is balanced ($T_{21} = T_{12}$), because everyone operates on the budget constraint. The extension of our results to purchases is therefore straightforward, and we will omitt purchases from our discussion. WRI occurs if industries $1, 2 \ldots I/2$ are located in one of the regions, say Region 1, and industries $I/2 + 1$, $I/2 + 2 \ldots$, I are located in Region 2. Then Region 1 sells only the output of industry $I/2$ to Region 2, while Region 2 sells only one half of the output of industry I to Region 1. Denote the variables pertaining to such a case with a w,

WRI:

(2.9) $GO_1^w = \ell I/4\,(I/2 + 1)$ $\quad T_{12}^w = \ell I/2$, $t_{12}^w = 4/(I + 2)$, $T_{11}^w = \ell I/4\,(I/2 - 1)$, $t_{11}^w = (I - 2)/(I + 2)$

(2.10) $GO_2^w = \ell I/8(3\,I + 2)$ $\quad T_{21}^w = \ell I/2$, $t_{21}^w = 4/(3I + 2)$, $T_{22}^w = \ell I/8(3I - 2)$, $t_{22}^w = (3I - 2)/(3I + 2)$

Now, we can characterize the two regions of IRI as **more integrated** than the two regions of WRI, because, given equal endowments and full market integration in both economies, inter-regional trade in IRI is higher than in WRI. To control for the effects of size

of the economies in question and of industrial organization, trade should be observed in proportion to gross output.

We can provide here an illustration of a channel through which economic integration might affect social and political structures, introducing the concept of inter-regional dependence. Operationally, we can measure the dependence of one region on another as the potential cost of its exposure to shocks in the other region. Assume that there is a probability π for every enterprise that it may suffer a shock resulting in a decline of its production to $(1 - \lambda)x$. Assume, further, that obtaining a replacement for a unit of any input costs γ (in addition to the input's price). Then, irrespective of the regional allocation of industries, the total expected cost of all shocks to suppliers in, for example, the region that does not contain industry 1 (region 2 in our examples) will be

(2.11) $E(R_1 + R_2) = \pi\gamma\lambda x(I/2)$

where R_h denotes the cost to region 2 originating in region h. However, the distribution of the cost by region of origin will differ depending on regional industrial allocation. In WRI, the expected cost of shocks originating in region 1 is

(2.11a) $E(R_1)^w = \pi\gamma\lambda x$

while in IRI this cost is

(2.11b) $E(R_1)^I = \pi\gamma\lambda x(I/2)$

that is, $I/2$ times higher. Clearly, in IRI the entire risk to suppliers of firms in Region 2 is under the influence of factors specific to Region 1, while in WRI only $2/I$ of the total risk is under the control of factors specific to Region 1.

To the extent that in the real world the risk of shocks can be reduced through cooperation among economic agents, or their costs can be minimized through, for example,

insurance policies, a higher level of integration will be conducive to greater inter-regional cooperation and a higher probability of emergence of economy-wide (as against region-wide) insurance. Much of what governments do is exactly that: provide a venue for cooperation and coordination of interest groups, and provide broadly defined insurance (such as compensation for unemployment) in the face of risk. Therefore, the economic agents in a more integrated economy can be expected to be more interested in a strong central government than those in a less integrated one.

2.3 Evolution of Regional Industrial Allocation: Two More Examples

To explore some additional aspects of regional industrial allocation, we present here two examples of economic integration in the context of growth. Assume, now, that the basic economy consists of as many regions as industries, that is, I regions. As before, assume that the regions are of the same size, that is, each region has ℓ representative individuals. Clearly, in equilibrium, each region will have one enterprise producing one of the I goods, and no two regions will produce the same good. If we index the regions with the name of the good they produce, then region i will sell all its output to region $I+1$ and only region I will have some intra-regional trade. The output of each region will trivially equal the output of its industry, both in terms of number of units (x) and value ($GO_i = p_i x$). The trade ratios will be

(2.12) $t_{i,(i+1)} = 1$ and $t_{i,i} = 0$ for $i = 1, 2 \ldots (I-1)$

$t_{I,r} = (I-1)/I \quad t_{I,I} = 1/I$

where the subscript r stands to denote the sum of all regions other than I.

Now consider the effect of an increase in the labour force, evenly distributed across all regions, at the rate of g so that

$$\ell' = \ell(1 + g),$$

where "prime" denotes variables in equilibrium after growth. The new equilibrium output will be

(2.13) $x' = (\ell(1 + g) - \alpha)/\beta.$

Output will increase at a higher rate than labour since

(2.14) $x'/x - 1 = g\ell/(\ell - \alpha)$

and $\ell/(\ell - \alpha) > 1$ since $\ell > \alpha$ is a requirement for this economy to be viable.

It is easy to show that the representative individual's consumption will increase in this economy, at the rate of $\alpha/(\ell - \alpha)$.

Similarly, equilibrium product prices will be lower than before growth. Denote with $\rho' = \alpha/(\ell(1 + g))$. Then,

(2.15) $p_i' = i\beta/(1 - \rho')$ $\qquad i = 1, 2, \ldots, I$

The value of output will increase proportionately to the labour force, and so will trade. Therefore, the trade ratios will remain the same as before growth.

Now consider a different pattern of growth. Say that for some reason (possible reasons are discussed later) import-substitution happened in each region with respect to the intermediate input, and that after growth each region has two industries (two enterprises). To maintain symmetry, assume that region 1 added a plant producing good I. Therefore, after the expansion of the labour force region k (where $k = 2, 3, \ldots I$) contains one plant producing good k and one producing good $(k - 1)$ while region 1 has one plant producing good 1 and

one producing good I. Now, in each region k such that $1 < k < I$ one enterprise (producing good $k - 1$) will deliver all its output inside the region, (to the enterprise producing good $k + 1$), while the other enterprise will sell all its output to region $(k + 2)$. In the economy as a whole there will be two enterprises producing each good, and they will be in "adjacent" (by index number) regions. "Adjacent" regions will stop trading, but trade will become established, at a lower level, between regions one index appart. Denote all the variables in this economy with a double prime. This economy will be characterized by the following relations

(2.16) $x'' = (\ell(1 + g) - 2\alpha)/\beta$

$$p_i'' = i\beta/(1 - 2\rho') \qquad i = 1, 2, \ldots, I$$

$$GO_k'' = \ell(1 + g)(2k - 1)/2 \qquad k = 2, 3 \ldots (I - 1)$$

Call, for convenience, the first type of growth "integrated growth" (IG) and the second, "disintegrating growth" (DG). Output and consumption per capita in DG are lower while prices are higher than in IG. Value added in the two types of allocation are the same, $\ell(1 + g)$, but the real wage (the inverse of the price of product I) is lower in DG. The loss in real output relative to IG's output is

(2.17) $x''/x' - 1 = -\alpha/(\ell(1 + g) - \alpha)$.

It can be shown that for values of g such that $g\ell < \alpha$ real output will be lower than before growth. Similarly, consumption of the representative individual in DG will be lower

than consumption before growth if $g < 1$. Finally, the ratio of inter-regional trade to output is lower and that of intra-regional growth is higher in DG than in IG or before growth:[9]

(2.18) $T''_{k,k+2} = k\,\ell(1+g)$ $\qquad k = 2, 3 \ldots (K-1)$
$t''_{k,k+2} = k/(2k-1)$

$T''_{k,k} = \ell(1+g)(k-1)/2$ $\qquad t''_{k,k} = (k-1)/(2k-1)$

We would, therefore, characterize the regional economic integration of DG as lower than integration in either IG or the economy before growth. Note that DG is a growth pattern that can be repeated in an iteration of steps—in the next step for each region k the input $k-2$ will be import-substituted—until each region produces all I goods and becomes autarkic.

The import-substitution depicted in DG can be viewed as an extremely simplified model of a step in the process that Yugoslavs referred to as the "closure" or "autarkization" of the regional economies. (The existence of more enterprises producing a good than is needed to satisfy market demand efficiently was referred to as "capacity duplication"). "Autarkization" was clearly viewed as suboptimal from a welfare point of view and it was vaguely attributed to purposeful regional policy-makers' action in an effort to reduce the dependence of their respective regional economies on that of other regions.

Market institutions and forces in former Yugoslavia in the decades of the 1970s and 1980s were sufficiently strong as to beg the question of how would import-substitution have come about, particularly if it entailed inefficiencies in production, and further, how would this allocation be sustained. Regional tariffs or discriminatory taxation would have sufficed to bring about and sustain a DG-type allocation in a market economy, but these were

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[9]The equilibrium trade ratios will be somewhat different for regions 1 and I, but in essence developments will be the same in their case as well. Since there is no insight to be gained from the analysis of the outcomes in these two regions, their case is not be explicitly discussed.

forbidden by federal law in former Yugoslaiva and there is no evidence that they were practiced. Before further exploration of this issue, it will be instructive to explore the circumstances under which market forces, without any distortions, would have lead to an evolution of regional industrial allocation along lines similar to DG.

2.4 DG Growth as an Efficient Pattern

Two factors that we have originally assumed away could easily lead to an allocation along the lines of DG in an otherwise undistorted economy: **transportation costs** and **limits to economies of scale.** Both factors are undoubtedly present in the real world and, in their presence, the optimality of DG becomes a matter of time. Per unit of output losses caused by DG-like import-substitution (expressed in equation 2.17) decline with increases in g and g, clearly, increases with time. In other words, as the local market grows, there comes a point at which the per unit fixed cost of satisfying the demand for a good from local production becomes lower than the cost of transporting it from another region.[10] Similarly, if IRS are not limitless, as the size of the local market grows there will come a point at which the costs of supplying the market from one plant begin to raise. Eventually, the market will reach a size

[10]To see the effect of transportation costs, assume that they are of the "iceberg" type, that is, that transport causes only a fraction $(1 - tc)$ of the goods shipped in one region to actually arrive to their destination in another region. Assume also, for simplicity, that transportation within a region is costless. Then, setting tc to equal the percent loss expressed in equation (2.17) we can derive that when "g" is such that $\ell(1 + g) \geq \alpha (1 - tc)/tc$ it will be cheaper to open a local plant than to ship the good from another region. Moreover, at the point where $\ell(1 + g) = (I - 1)\ \alpha(1 - tc)/tc$ it will become more economical to produce all I goods locally, and autarky will prevail.

at which it becomes more economical to open a second plant than to continue expanding production at the first plant.[11]

Further, if some of the assumptions adopted in our basic model are weakened or abandoned, the forces bringing about a DG-pattern of industrial allocation, or DG's welfare implications can be seen under a different light. First, consider a slightly different interpretation of the source of IRS in the economy. IRS in our model arise from enterprise-specific, lumpy but recurrent expenditures, α. The recurrence of α is implicit in the fact that we assume the process of competition to be costless even if it may consist of repeated entry and exit of a certain amount of labor—covering both fixed and variable costs—into various industries until equilibrium is reached. This assumption would be an adequate representation of costs such as company overhead which can easily be dismanteled, but are not proportional to the scale of production and cannot be avoided if production of any scale is to be undertaken.

However, economies of scale often arise from **costs that, once sunk, cannot be recovered** within a relevant time frame. One example are costly, industry specific installations (such as furnaces for an iron smelter, or irrigation systems); a different example is the cost of educating a labour force in industry-specific skills. The benefits from the goods created with such expenditures may often be industry- rather than enterprise-specific. The goods themselves are often not mobile. In many cases they are probably better thought of as specific factors of production.

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[11]At this point, whether concentration of enterprises in an industry or their dispersion across the national territory would be preferable depends on numerous factors such as the geographic distribution of markets, transportation costs and the existence of externalities and agglomeration economies. These are presently dealt with in the literature termed "new economic geography." For a review, see Krugman P. (1998).

The model developed in the previous pages is not an adequate representation of this kind of lumpiness in technology. Without attempting its analytic adaptation, we can, conceive of the implications of this type of economies of scale by considering that the production of each (or some) of the *I* goods in our model requires the use of a specific factor of production, in a lumpy form, in addition to the other elements of the production function in (2.2). These factors may be assumed given only by nature, or they may be assumed to be created by market forces or policy. Once in place, they tie an industry for a location. It is entirely possible that, even if the choice of location for the creation/replication of a factor was sub-optimal from an ex ante perspective, once the expenditure has been incurred, ex post, it is more efficient to continue production at that location than to attempt to move the factor.

Note that the process of development can be pictured, to a large extent, as a process of sequential creation of such specific factors of production. To the extent that such factors are being created in locations where they were previously absent, development is inherently disintegrating.[12] That is, we might observe a DG-like pattern of industrial allocation as a consequence of the replication of specific factors of production resulting from development, with or without policy intervention.

We next consider the effects of relaxation of the closed economy assumption. First, with the introduction of the **rest of the world, or third markets**, the share of inter-regional and intra-regional trade in total output need not sum up to one. Declining inter-regional integration may be matched by increasing intra-regional trade, by increasing integration with

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[12]This statement is correct as long as we assume no intra-industry trade. In fact, experience shows that intra-industry trade gains in importance with development.

foreign markets, or by both. For example, in many circumstances the decline in inter-regional trade following a DG patterned growth would have been accompanied by both an increase in intra-regional and an increase in foreign trade, as producers strove to minimize average costs by expanding the scale of production.

Second, if foreign trade is assumed to have been unfettered and access to foreign markets is assumed to have been straightforward (including that transportation costs to third markets should not be overwhelmingly higher than those between the regions in consideration), average costs in production can be reduced by employing excess capacity in production for foreign markets.[13] With this possibility, the inferiority of a DG-like allocation can be substantially weakened. If, moreover, the substitutability between foreign and domestic goods is high, issues of regional interdependence and exposure to other regions' shocks also become less prominent.

Since Yugoslavia was a small, centrally located economy, the existence of the rest of the world should in principle substantially weaken the applicability of our model to its case. However, heavy protection and market signal distortions limited the role played by foreign markets in former Yugoslavia. On the importer's side, high protective barriers raised the costs, pecuniary and others, of obtaining substitutes for domestic goods. External protection was also instrumental in preserving inefficiencies, those caused by "capacity duplication" as well as others. These, finally, resulted in product deficiencies that limited the marketability of Yugoslav goods abroad, effectively limiting the size of foreign markets for it. Therefore, on the exporters' side, the foreign elasticity of demand was not infinite, despite

[13]Note that with the introduction of foreign trade, the existence of a limit to IRS or downward sloping demand for any good has to be assumed. Otherwise one firm would eventually dominate the world market.

the relatively small size of the former Yugoslav regions, and this limited the potential for exploitation of economies of scale through foreign trade.

Finally, our model shares with traditional economics a view of industries as consisting of homogeneous goods. Once **product differentiation** is introduced, our model's predictions concerning the territorial distribution of trade become substantially weakened and can even be inverted. To see this, assume that each plant in industry i may actually produce a range of varieties of good i. Assume, further, that the Leontief relationship for the intermediate input allows for numerous varieties of a good to be used in the production of numerous varieties of the product's output. What is more, we can assume that the use of a broader variety of inputs increases the productivity of industry $i + 1$, as well as the range of varieties of good $i + 1$ produced. Finally, assume that consumers' utility functions are defined over a range of varieties of the consumption good. In this economy, increasing the number of varieties of the consumption good is profitable, which may result in there being more than 1 plant per industry in a competitive, undistorted equilibrium. In other words, market forces could result in a DG pattern of growth even without transportation costs and limits to IRS. Moreover, in this scenario region $i + 1$ would not stop purchasing goods from region i, although the share of i's output sold to region $i + 1$ would decline relative to that resulting in IG. Further elaboration of the existence of product differentiation and intra-industry trade could give higher levels of trade in a DG-patterened than in an IG-patterned economy.

CHAPTER THREE

INSTITUTIONAL CLEAVAGES

In this Chapter we analyze the institutions that may have promoted a DG-patterned process of growth in former Yugoslavia, as well as identify some factors that might have reduced inter-regional trade at any given level of specialization. We analyze the evolution of regional trade flows and industrial allocation in former Yugoslavia as the outcome of a combination of three decision-making processes: (a) decisions on day-to-day business (buy/make/sell options); (b) decisions on resource allocation; and (c) decisions affecting the constraints and parameters faced by any agents making the decisions under (a) and (b).

Much like in any mixed economy, in former Yugoslavia the decisions about resource allocation (other than in areas which are often in the public realm such as social services and infrastructure) were made by banks and enterprises; business decisions were made by enterprises; and decisions on the economic environment were made by the government. However, the institution of social ownership reduced the autonomy of market agents in Yugoslavia compared to a capitalist economy and it intimately bound them to a politically defined territory. Moreover, the government was peculiarly decentralized so that political intervention, when it happened, always had a territorial dimension.

In section 3.1 we identify the role of economic agents and policy-makers in microeconomic decision-making. In section 3.2 we discuss the relationship between local-level and regional-level policy makers and their respective influence over the economic process. In section 3.3. we identify motives of economic agents and policy-makers and gauge the extent to which these might have led to day-to-day or investment decisions aimed directly at increasing the autarky of regions. In section 3.4 we present how the territorialized pattern of occasional economic rationing might have contributed to a rational preference by economic agents for business within the boundaries of their territories in their day-to-day economic decision. In section 3.5 we describe the capital allocation process and its territorialization. In section 3.6 we show how the territorialization of capital allocation together with the systemic tendency to maintain enterprises in operation at almost any cost, promoted a DG-pattern of growth, and we describe how protection of regional and sub-regional economies could have been effected in the absence of explicit barriers to trade.

3.1 Microeconomic Decision-Making

Three socio-political groups affected the decision-making of the enterprise: labor-management, operational management, and representation of society-at-large. For analytical purposes, we will consider labor-management and operational-management as pertaining to the enterprise, but any representation of society at large, even when inside the enterprise's organizational structure, will be considered as extraneous to it.

As formally conceived by the designers of the system, labor-management represented the will of the "work collective" (*radna zajednica,* the body of all employees in an enterprise) and took the decisions pertaining to the goals and strategies of the enterprise's

activities, such as adoption of the annual plan and approval of reports. It also decided the distribution of income and personnel policy and made the decisions regarding social issues entrusted to enterprises, such as enterprise-financed housing and vacation facilities. Labor-management was direct, through referenda and collective meetings, and indirect, through various representative bodies, the most important among them the Workers' Council.

Operational management was professional staff. It was charged with the execution of the Council's decisions and accountable for the legality of enterprise operations. It provided managerial expertise for the enterprise, served in an advisory capacity to help labor-management make well-informed decisions and prepared the drafts of annual plans for consideration and adoption by the Workers' Council. Operational-management staff could not be members of labor-management institutions. They could attend a Workers' Council or other labor-management meetings, but only in an advisory role.

While work collectives had the inalienable right to dispose of their labor and decide about income distribution, they did not have full ownership rights over the assets they used in production. Work collectives were viewed as having been entrusted with society's assets—they could not, for example, sell the assets and distribute the proceeds among themselves—and society had the right to ensure that the assets were developed in the interest of all.

One key channel through which society at large affected the enterprise's decision-making was through the institution of social planning. Social planning had been developed as the coordination mechanism for a system of self-government that endeavored to brake away (or to appear to be breaking away, according to more cynical views) from traditional lines of state authority. The Yugoslav body politic was conceived as an association of socio-

political communities (*društveno-političke zajednice*, SPCs hereafter), starting with communes and aggregating into towns, provinces and republics, and finally the federation. The commune was the basic organizational level at which citizens self-governed through representative political bodies and through labor-representation in their place of employment in the context of the system of associated labor.[14]

Social planning replaced the more conventional indicative planning of the late 1960s with a "multilateral and polycentric bargaining process" (E. Comisso, 1980). Each year, every Basic Organization of Associated Labour (BOAL) and other economic organization, provider of social services, and SPC adopted a plan specifying, among other, envisaged activities, projected results, sources of financing, and planned income distribution.[15] The plan had to be in harmony horizontally, among the BOALs in a Work Organization (WO) and with basic providers of social services; and vertically, up the ladders of economic association—BOALs, WOs and Composite Organizations of Associated Labours (COALs)—and up the ladder of SPCs, from commune to Federation. While, in principle, planning and coordination along industrial branch associations or between business partners was encouraged, the planning system was organized territorially and flowed from the bottom-up.

Social plans were not legally binding, which is clearly borne out by the frequency with which they were disregarded. However, implementation in some areas of annual plans, especially the fulfillment of their attendant self-management contracts, was overseen by the

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[14]For a summary description of the system of associated labor see Appendix II.

[15]When describing institutions that refer to particular types of organizations in the system of associated labor, we will refer to these organizations with the terminology of the system, BOALs, WOs, and the like. When the exact identification of the type of organizational unit is not important, we use the generic term "enterprise."

Social Accountancy Service (*Služba društvenog knjigovodstva*–SAS) (described below). If they were not being observed, and the BOAL could provide evidence that its current situation simply did not allow for their realization, the BOAL was obliged to revise its plan adopting less ambitious targets. Like the drafting and adoption of the original plan, the revision of a plan was a time-consuming and costly process. This, in and of itself, would have been an important incentive for planners to try to get things right the first time around.

In addition to social planning, institutional channels existed through which enterprise decision-making itself could be affected by political bodies. One was direct representation of society-at-large inside the enterprise, through enterprise units of socio-political organizations—the League of Communists of Yugoslavia (LCY), the Labor Unions, and others. These units had become all but irrelevant to economic decision-making already in the mid 1960s, their primary role being the reverse—to mirror the economic structure in political organization.[16]

More importantly, enterprise decision-making could be affected by political bodies formally and informally, through pressures, because of the leverage that the SPCs held over the enterprise. One key lever of political influence was that in the period of our analysis communes had a role in the appointment of operational management. Whenever a top operational-management position needed to be filled in a BOAL, the assembly of the commune in which the BOAL was located appointed one-half of the members of the "nominating commission" whose task was to identify the candidate(s) for the position. The

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[16]For a citation of numerous surveys conducted in the 1960's attesting to the fact that internal Party organizations carried little weight in enterprise decision-making see A. Carter (1982). For examples of such surveys in the 1970's see Prašnikar and Svejnar (1987) and Schrenk (1981).

other half of the commission's members was sent from the Workers' Council of the BOAL. The BOAL Workers' Council could rightfully refuse to appoint the commission's choice, in which case the selection process had to be repeated. A prolonged stalemate in the selection process, however, could be used by the Commune to argue serious obstruction of labor-management in the BOAL. This, in turn, was valid grounds for imposing "obligatory management" (*prinudna uprava*), that is, temporary commune-controlled management.

Another important lever held by SPCs over the economy was their rightful financial control over economic agents disposition of social property. The commune, in particular, had a duty to intervene if an enterprise fell into financial difficulties or exhibited a clear pattern of disregard for statutory safeguards of social property or internal self-management rights. In fact, communal governments held the strings of the financial purse that could keep troubled or inefficient enterprises afloat for indefinite periods of time.

The teeth into SPC's right to financial control were ensured by the existence and powers of the SAS, a financial inspection and services institution with which all organizations in the socially owned and governmental sectors (including banks) were required to deposit their holdings. It was the duty of the SAS to keep a check on the legality of all financial operations of, among others, enterprises, which in the former-Yugoslav context meant making sure they complied with the myriad regulations imposed by all three tiers of SPCs.[17]

The commune was interested in the protection of social property not only because of the obvious political implications of enterprise failure or misconduct, but also because it was

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[17]For more detail about the operation of the SAS see Yugoslav Survey (1978).

ultimately financially accountable for its enterprises' operations. When a BOAL incurred losses, the SAS notified the communal authorities, setting in action a chain reaction of "protection of social property." The compulsory reserve fund of the BOAL and of the economic associations to which it belonged was drawn on first to cover the losses. There were also joint reserve funds, in place since 1962, financed through compulsory enterprise contributions at the communal and other territorial levels (IBRD, 1975). These could be called upon to extend credits to a troubled enterprise when the resources of fellow BOALs inside its WO (or a wider association to which the enterprise belonged) did not suffice to cover the losses. For example, in 1978, enterprises suffering losses accounted for 10 percent of the gross sales of Croatia's economy. The BOALs covered 24 percent of these losses from their own reserves. Of the remaining losses, 52.2 percent were covered by loans from local and regional reserve funds, and the rest from loans and grants from associated BOALs, from SPC budgets, and by banks (Čonkas, 1980).

If an enterprise suffered protracted and serious financial difficulties that prevented its compliance with legal requirements and regulations, the SAS would block its giro accounts. At this point, a BOAL could be put under obligatory management and a recovery program imposed. If this did not give results, or if such proceedings were not undertaken, the SAS, creditors, the local prosecutor or, under the system of 1974, special magistrates for the protection of self-management (*društveni pravobranioci samoupravljanja*) began bankruptcy proceedings.

The decisions to impose obligatory management or initiate bankruptcy procedures were not based on clear-cut financial criteria. Instead, the communal Assembly, banks and business association were asked to give their opinion on the capacity of the enterprise to

recover, a discretionary power that enhanced the leverage of the SPCs over the economy. For example, out of 99 WO suffering losses in the wider Belgrade metropolitan area in 1969, only 11 had been put under obligatory management (Olbina, Ž. and Papic, Ž., 1971).

It is important to keep in mind, however, that financial leverage worked in the reverse direction as well. Communes were financed largely from contributions by the economy on their territory. Therefore, a financially sound enterprise was viewed as an asset and the commune had generally little power or desire to intervene in its affairs.

3.2 "Intervention" at the Regional Level

The formal levers of political intervention in the economy's decision-making that we described were generally held at the local, commune level. A typical commune numbered 15–20 thousand inhabitants.[18] This is not so much more than the labor force of the largest enterprises, which opens two related questions: (a) how could communes effectively influence enterprises that were sometimes larger—in terms of economic or political power—than themselves?; and (b) did regional level institutions have a channel of "intervention" in decision-making at the microeconomic level as well? Formally, the answer to the first question is that communes could affect large enterprises to some extent because they formally never faced the whole of a large enterprise, but dealt with the enterprise divisions, BOALs that had headquarters in their territories.[19] Formally, at least, any

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[18]At the beginning of our period of analysis, there were approximately 500 communes. By the end, in 1987, their number had increased to 530. The mode population of a commune was 15–20 thousand, but most were larger, with 41 totaling over 100 thousand inhabitants in the 1981 census (SGJ, 1988).

[19]There were 24,949 basic organizations in the socially owned "economic" sector in 1979 (SZS, SGJ 1980). BOALs or WOs without BOALs comprised about 22 thousand of these organizations. The rest were special (continued...)

intervention in affairs of WOs or other higher BOAL associations was articulated through communal intervention at the level of the BOALs comprising the association. The commune, therefore, always faced a "divided" adversary.

The full answer to the first question, however, is that, informally, the truly large and strategic enterprises as well as banks, did not come under the authority of communal, but of regional governments and institutions. The exercise of this authority was somewhat of an institutional somersault, however, for in the formal lines of governmental authority the regions found themselves in an odd position: as intermediate steps in a bottom-to-top hierarchy of associations. On the one hand, 20 years of decentralization not withstanding, macroeconomic policy was still carried at the federal level. On the other hand, the day-to-day business of government, presumably self-government, was at the communal level.

Because the exercise of self-government was most direct at the commune level, Communes had constitutional rights and were to govern by their own statutes; their functions and powers could not be defined by Republican law. Already in the 1963 Constitution all but one formal line of authority of higher- over lower-tier SPCs had been eliminated. In 1974 even that last line, the appointment of public prosecutors by higher level SPCs, was abolished. In general, a lower SPC's actions could be challenged by a higher SPC only

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[19](...continued)
types of organizations in some smaller areas of the social sector, such as agricultural cooperatives (I. Todorović, 1987). Based on SGJ (1980) data, the median and mode (5,816 enterprises) were organizations with 61–125 employees. Almost as many organizations (5,423) had 126–250 employees. Another 3,366 organizations had between 251–500 employees. The remaining 13,710 organizations were spread widely across the spectrum, from less than 6 employees to over 2,000. This does not conform with the findings of Prašnikar and Svejnar (1987) and Sacks, S. (1980) that BOAL size tended to cluster around 400–500 employees. Their findings are based on enterprise samples and may have been biased by the industry composition of the sample. BOALs tended to cluster around the size they cite only in some industries.

through court. Therefore, the formal power of regions to undertake positive action with regard to communes was very limited.

Formally at least, government at the federal and regional levels was similar in that it largely consisted of providing an arena in which the bargaining and coordination of lower-level SPCs was to take place. *De facto*, however, their situations were symmetrically opposed: numerous crucial policy-making issues still had to be decided at the Federal level, but the federal institutional body was really only a bargaining table for regional interests; contrary to this, few issues of government were formally decided at the regional level, but regional authorities governed through their informal hold over the communes.

Regional power over the communes was based on the fact that the only institution with vertical lines of authority flowing down from above in the entire politico-economic system was the LCY, and the top of the LCY hierarchy, with the exception of Tito, was at the regional level. To understand this, we need to explore for a moment the relationship between the party and the state.

In the period of our analysis, with two exceptions, the formal separation of the LCY from government was complete. The exceptions were the LCY's control (through a proxy organization) over the electoral process, and the membership of the head of the LCY in the Presidency of the Federation (this post was filled by Tito until his death). Day-to-day issues of government did not figure on the agenda of LCY meetings, and formal LCY approval or representation was not required in the adoption of government decisions.[20]

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[20]For a more detailed discussion of the LCY see A. Carter (1982).

That the LCY could do that and still retain political control was a consequence of historical circumstances. The Communist Party of Yugoslavia had filled a power vacuum and led the liberation struggle during World War II. Once in power, it built and populated the State's institutions. After the two-chair practice of simultaneously holding both Party and State posts in the 1950's was abandoned, the Party-State bond survived through a new type of cadre overlap.

The new type of cadre overlap was effected through the emergence of bodies of professional politicians who spent their careers switching between posts in the Party, later called LCY, government, and, to a lesser extent, enterprise management. As such bodies existed at each level of government, and as links among individuals existed both within the same and between two different levels, we can envisage these bodies as hierarchical networks starting from the basic organization and building out and up through the communal levels to the regional. The links were both personal and functional, and much formal and needed information exchange flowed through them. However, they were cemented by personal loyalties and debt so we will refer to these bodies as "patronage networks."

Key to the power of the regions in the system of 1974 was that in the democratization of the Party in the 50s and 60s the region had become the top of the hierarchy. The Federal LCY had become a collection of regional parties: the vertical lines of LCY authority flowed from the region down, and the networks did not cross regional boundaries.

The extent of Party regionalization was not obvious to many at the time because in the 1970's Tito stood at the top of the LCY hierarchy. Tito's power, however, did not reside in a patronage network. In the process of the party's democratization and decentralization, Tito and a dwindling handful of the earliest Party leaders had gradually elevated themselves

above the kind of intimacy that is usually implicit in patronage. The methods and hold on power of Alexander Ranković, the hardline chief of police and second in the LCY's command until the mid-sixties, had been the last attempt to extend a network of this type beyond regional boundaries, but instead Ranković fell from power. By the early 1970's, Tito was all but alone at the top. While Tito lived, unity of LCY action could be attained even at the federal level, but, with his death, only the sub-federal hierarchies remained.

In the system, patronage over small enterprises belonged to the communal level of the network, patronage over large enterprises and banks belonged to the regional level. As long as the LCY could maintain control over the electoral process, ensuring that its cadres continued to populate government institutions, it had no great need for other formal levers of control over the governmental process. This structure put the LCY firmly in the role of coordinator and initiator as well as ultimate arbiter for the dozens of communes comprising the regions, despite the fact that it formally stood on the sidelines of the system of government.

3.3 The Players' Motives

3.3.1 The Motives of the Enterprise

Non-economic considerations certainly played a greater role in the Yugoslav labor-managed enterprise than in the typical privately owned enterprise. However, few would attribute growing autarky to some *a priori* territorial partiality of the Yugoslav labor-managed firm. The objective function of the former-Yugoslav enterprise has been thoroughly studied in the Western and Yugoslav literature alike, and in both it has been approached from various perspectives.

A strand of the mostly Western literature, based on the classical theory of labor-management, is premised on the view that the maximand of a labor-owned enterprise is income per worker. The literature analyzes variants of the basic model focusing on different aspects of the reality of the former-Yugoslav enterprise. Many in this literature first ask if the assumption of labor-ownership corresponds to the reality of the Yugoslav firm, and in general conclude that it comes close enough to merit the further study of its behavior as an example of a labor-owned enterprise. More institutionally oriented studies, often based on surveys, arrive at various complex objective functions that usually single out maximization of personal income but also comprise other goals that could be identified with the motivations of operational-management, such as enterprise growth. In former Yugoslavia, thinking was bitterly divided between a school that argued that the maximand of the enterprise was total income per unit of labor and a school that argued that it was a specific definition of profit.

For our purposes there is no need to decide which of these motives was the enterprise's primary driving force. All of the enterprise objective functions considered by the literature incorporated, first, material-input cost minimization and, second, an interest in obtaining a price as high as possible for any given level of sales. This implies that the enterprise as buyer had an unambiguous interest in exploiting any gains obtainable from trade—no less from trade across than from trade within territorial boundaries. The enterprise would not, without undue external pressure, simply chose to buy a more expensive or a product of lower quality, solely because of its origin.

The firm might have sought protection within the domestic market if it was deemed that this would secure higher prices, without diminishing its output. However, protection

might have been perceived as disadvantageous if, because of reciprocity between potential trade partners, it resulted in a reduced level of sales. The latter consideration would have been particularly important if the enterprise operated in the region of increasing returns to scale which was likely to be true considering the technology prevalent in Yugoslavia during the years of our analysis, and the size of communal and even regional markets.

Contrary to the impression given by numerous press reports at the time, a survey of 147 WO conducted in the early 1980s on the territory of Yugoslavia found that a full 90 percent of enterprises considered their market to be "the territory of Yugoslavia" or "Yugoslavia and the rest of the world." Only 4.8 percent of WOs considered their market to be their commune. The remaining 5 percent considered their market to be the region (J. Prašnikar, 1983).

3.3.2 The Motives of Policy-Makers

Could autarkic firm behavior have been the result of purposeful political intervention as was sometimes considered by the public? Could it be, for example, that nationalist or plain regionalist inclinations by policy-makers led them to intervene and pressure enterprises into investing in goods that would replace their inter-regional purchases? Were they able to force enterprises to buy locally rather than across territorial borders? It is our view that the levers that policy-makers held over the economy allowed for the exercise of such influence only selectively.

Two reasons make it highly unlikely that such intervention in the enterprise's day-to-day decision making would have been prevalent or even regular, not even when the

expression of nationalist feelings became legitimate and gained increasing weight in regional official political rhetoric.

First, consider the complexity of the intervention process and the cost of exercise of political leverage over economic agents. The formal autonomy of the firm was very broad. Political bodies could replace operational management but only after all-out complex campaigns in which they would have to: (1) pressure/gather the support of labor-management; (2) be able to argue that the reasons for the intervention were of overwhelming importance to the health of an enterprise. The loyalties of operational management might have been divided (between labor-management, identification with the enterprise as an organism, and communal political institutions) but in most cases operational managers were not political appointees. No less complex was the use of financial leverage. It also involved numerous political and economic bodies and it also required a well argued case.

Clearly, it made sense for policy-makers to use their leverage only selectively, at junctures that were considered critical for the attainment of their goals. So whether such selective intervention was disintegrative or not, depends on whether disintegration served policy-makers' goals.

This brings us to the second issue—what were the primary objectives of policy-makers at the various tiers of government? What kind of issues would have prompted them to use the leverage they had? With regard to the economy, we can assume that policy-makers' two top priorities were employment growth and financial health. In former Yugoslavia, policy-makers were particularly motivated to promote employment growth because in the former Yugoslav ethos employment was a basic human right. Moreover, the

pressure to provide employment locally was intensified by the powerful obstacles to labor mobility created by labor-management institutions.

Employment creation was a powerful incentive for policy-makers not only to offer protection to enterprises on their territories when competitive pressures imperiled their survival, but also to intervene and insure that what resources were available were invested within their respective territorial boundaries.

SPCs were interested in the financial health of their economies not only to secure long-term employment growth but also because the bulk of social expenditures and a significant portion of an SPC's budget was financed from levies on personal income paid by BOALs located in the territory of the SPC. In the case of less developed SPCs (regions within the federation, or communes within a region) significant financing also came from grants-in-aid. Only a small fraction of SPC revenues came from levies on enterprise income, or profits, or other taxes and it is highly unlikely that an SPC might ever have seen the prospect of collecting taxes on profits earned by a "domestic" BOAL from investment in another territory as an attractive financial proposition.

The fiscal decentralization reinforced policy-makers' interest in maintaining investable resources within their territorial boundaries. Interest in the financial health of enterprises was also cause for intervention in basic economic decisions at critical junctures, for example, when shortages of key inputs threatened to disrupt their operation seriously. In

those circumstances, policy-makers' intervention would insure that resources in short supply stay within the boundaries of the respective territory.[21]

Therefore, we identify three types of circumstances in which intervention would have served the policy-makers' goals and have had a disintegrative effect on the economy: retention of investible resources and materials within the confines of their territory; occasional rationing of goods (or foreign exchange) in short supply; and protection of enterprises in financial difficulty. How exactly these kinds of intervention at selective junctures might have combined to have a more pervasive effect on disintegration, is explored in turn.

3.4 Market Disequilibria and Political Intervention

A role for policy-makers in the rationing of goods or foreign exchange and in investment decision-making was formally sanctioned in the context of the system of social planning. Economic and political agents at each SPC level were supposed to agree on a common set of priorities and the best way to achieve them. In this process they were encouraged to replace market allocation mechanisms with negotiated outcomes. Even if all decision-making was effected as envisaged by the formal system, the fact that, by virtue of the territorial organization of the planning process, bargaining and coordination within a territory was more immediate than across its boundaries would have resulted in better information exchange and more effective coordination within territories than across them.

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[21]This was in essence the same phenomenon that in Soviet parlance was referred to as "parochialism" (*mestnichestvo*). Yugoslav policy-makers, however, had fewer formal levers of control to effect this kind of intervention than did Soviet policy makers.

This, in turn, would inevitably have led to closer business ties within territories than between them.

However, the frequency with which specific markets found themselves out of equilibrium, the scope of business practices that in the overly-regulated Yugoslav environment fell into "grey" or outright "black" areas of legality, and the fact that the formal communication networks envisaged by the system of social planning nearly coincided with the informal networks of patronage, all combined to deepen the cleavages drawn by the formal system. For example, pervasive price controls were often circumvented through the practice of charging implicit prices. The surcharges typically took the form of "contributions" for purposes specified in self-management agreements. Or, a different example would be of a manufacturer with earning potential on foreign markets and confronting a foreign exchange shortage who would have been willing to sell his product to any domestic customer paying in foreign exchange. Such operations would require more or less complicated financial arrangements to insure that everything remained in the grey area of legality. And complex "grey" financial arrangements, we may assume, were more easily made within one's own patronage network (M. Rokvić, 1983b).

Under conditions of market equilibrium, this might not have been significant. However, frequent market imbalances and shortages introduced a substantial risk to market operations, and the possibility of controlling supply through the system of social planning or one's own patronage network reduced the risk of transactions carried inside the domain of a territory. There was, in addition, an implicit contract, characteristic of patronage networks, to help an enterprise having difficulties in securing supplies or finding markets. Moreover, it might have been more difficult to raise prices for goods in short supply inside

one's own patronage network. Enterprises could take advantage of implicit price practices to engage in price discrimination, charging more of buyers in other territories. Finally, when under exceptional circumstances a choice had to be made to the detriment of business relations or obligations, all else equal, it is to be expected that the choice made would give greater weight to the interests of trade partners inside the enterprise's patronage network than outside.

Rationing by territorialized patronage networks directly affected inter-territorial trade. Assuming that it happened only occasionally, at selective junctures—as argued above—this would have little effect on inter-regional trade. However, in combination with the factors listed above, the effect of selective rationing was amplified in two ways. One was that a high probability of there being shortages of key strategic goods encouraged planners' inclination towards Wiles' "subordinate autarky," that is, the tendency of every sub-federal unit to insure its own sources of supply, thereby directly engaging in import substitution. It is this channel of disintegration that has most often been identified in the literature of former Yugoslavia.[22]

Second, the possibility that one would depend on rationing to secure inputs heightened the risk of inter-territorial business relationships. Whenever an enterprise entered into a business relationship across territorial boundaries, it knew that it would not be able to appeal to the territorial patronage network to secure deliveries should market disruptions arise. *Caeteris paribus*, the enterprise had less control over the reliability of such relationships than when doing business within its patronage network. This means that the enterprise was likely to attach a risk premium to an inter-territorial transaction which, in turn,

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[22]See the discussion at the Belgrade seminar: Savetovanje o Jedinstevnom tržištu u privrednom sistemu SFRJ (*Ekonomska Misao*, XIX/3, 1982).

would have introduced an element of enterprise "self-censorship" whereby preference would be given to trading partners within rather than outside the enterprise's patronage network. To the extent that market disequilibria intensified, the risk premium increased.

3.5 Capital Allocation

Just like the institutions of labor-management and social property discouraged wage competition, they also did not provide the incentives or channels for the flow of capital towards the location of its highest return, and therefore, to cross regional borders. Capital mobilization and resource allocation was probably the most difficult question posed by the institution of social property and, unlike the lack of mobility of labor, it was at the core of the process which might have led to regional despecialization and declining trade. The Yugoslav enterprise had motives to invest as long as the invested resources stayed within the confines of the firm. Enterprises invested in their own expansion, to diversify and to secure their own supplies. If, however, a new economic entity was created, its employees had to be vested with inalienable labor-management rights, meaning that the investor lost management rights over the project once it was put into operation. A parent company could, up to the early 1970's, charge interest on its investment but in 1971 that possibility was abolished, and only interest on bank financial capital could be charged. What, or who, would propel the creation of new enterprises?

In the early years of labor management this function was performed largely by para-fiscal "social investment funds" (*drustveni investicioni fondovi,* SIF) established at local, regional and federal levels, and fed by several fiscal sources, primarily taxes on enterprise income and interest on existing enterprise assets (*poslovni fond*). By the mid-1960's such

direct state intervention come to be viewed as alien to a labor-managed and socially-owned economy, and the funds were blamed for using non-economic criteria in their project selection. The system of social investment funds was abolished and their resources, together with the responsibility of capital mobilization, were passed to banks. Local level SIFs were passed on to local banks, regional SIFs were passed on to regional banks, and the Federal SIF was distributed among the three federal-level banks.

Thus, in the period of our analysis capital mobilization was formally entirely in the hands of economic agents. However, while formal identification of enterprises and banks with a territorial-political unit had institutionally been abolished, nothing in the new institutional set-up propelled economic agents to overcome the territorialized structure of ownership that had been previously administratively created. Less than 4 percent of all BOALs in 1976 were located outside the home region of the parent enterprise. In the ensuing decade the fraction declined to 2.2 percent (Burkett and Škegro, 1987).

3.5.1 Banks

In fact, for five years immediately following the reform of 1965, banks seem to have behaved surprisingly like their capitalist brethren, investing regardless of territorial boundaries, growing and giving rise to a powerful techno-managerial elite. This raised resentment and concern of two kinds: in the LCY, because it created competing centers of power; and in some regions (especially Croatia) because the country-wide operations of the three largest, formerly federal-level and now Serbian, banks were perceived as economic domination.

Institutional reforms of the early 1970s insured that (a) no bank's identity or financial power spread across regional boundaries; (b) bank management was put firmly under the control of associated labor, therefore eliminating the possibility of the creation of independent centers of financial power. The first goal was achieved by distributing the formerly federal SIF resources held by the three formerly federal-level banks among the regional banks. This, together with the banks' subjection to the control and ownership of Serbian associated labor, effectively turned them into Serbian banks.

The second goal, associated labor control over bank management, was secured through the institution of "founders" and "membership" in a bank. The basic unit of a bank, the Basic Bank, was founded by the "association of resources," that is, capital subscriptions, of its "founders," principally BOALs. Basic banks associated into "associated banks" in much the same way as BOALs associated into WOs. The founders of a basic bank became bank "members" on its foundation and managed the bank through representatives in the bank's assembly and various managerial boards. Members had equal voting rights regardless of the size of their capital subscriptions but bank profits were distributed in proportion to subscription. Only bank members could sit on bank boards. This excluded bank employees and professional staff as well as representation of SPCs, as SPCs could not be bank founders in the period of our analysis.

While the law explicitly forbade the denial of bank membership to a BOAL because of its location, by all accounts, bank ownership and operations remained highly territorialized in the 1970s and 1980s. We have no data on bank membership by location of member, but there is little doubt that this crossed territorial boundaries only exceptionally, if at all. Moreover, according to D. Savin (1982), only 14 percent of all basic banks were in some

form of association with banks in other regions, and only 2 percent of all bank deposits were inter-regional. Savin also reports that between 9.5-14 percent of all payments, including wages, and taxes, were inter-regional.

There is no public data on the territorial distribution of individual bank operations, but there are strong reasons to believe that in the Yugoslav case this mirrored the membership structure. The institutional reforms of the early 1970s transformed the banks into financial service agencies of its owners. Moreover, the low or negative real interest rates charged by banks represented a significant source of subsidies to borrowers. It is likely, therefore, that members allocated those benefits principally to themselves.

3.5.2 SPCs

In our period of analysis, the federal government had become devoid of power over investment other than for its own purposes. A frequently cited example of the power of the Federal government, the Fund for Accelerated Development of Less-Developed Provinces, (FAD), was indeed a powerful vehicle of income transfer among the regions: in the period of our study, it contributed between 10 and 35 percent of investment financing in Bosnia-Herzegovina, Montenegro and Macedonia, and substantially more in Kosovo. However, capital allocation by the FAD was not decided by Federal agencies. The quantities transferred and the rules according to which the amounts would be allotted among the less developed regions were decided by inter-regional bargaining. The specific project application was decided, in the earlier years of our period of analysis, strictly by the recipient region; in the latter years, the Fund's financing was transformed from concessional credits to obligatory

pooling of resources between developed donor-region and under-developed recipient-region agencies.

Sub-federal government units retained the right to invest in infrastructure development, for example, water resource management, roads and urban development, economic areas in which entry was not open to the labor-managed economy. Regional leverage in investment decision making was also retained through command of regional reserve funds, development funds (for the promotion of the accelerated development of less-developed sub-regions) and para-fiscal funds of a relatively *ad hoc* nature, for example, for disaster relief. Like the federal and local governments, regional governments did not have the authority to invest directly in enterprises. However, contrary to the federal government, regional governments retained a central position in the capital allocation process because this, more than any other economic-decision making, required the coordinating and initiating role of regional patronage networks.

3.5.3 The Investment Process

The exact process whereby a new enterprise was created is elusive. In fact, the creation of truly new enterprises appears to have been relatively rare in the period of our analysis. Most enterprise "entries" consisted of separations of BOALs from earlier associations, or of creation of new associations (I. Todorovic, 1987). However, when fully new ventures were undertaken, these appear to have often been initiated by SPCs, who mobilized banks and interested enterprises to finance the projects. In Belgrade, the large majority of investment projects prepared by the Institute for Industry were commissioned by communes (*Ekonomski Forum*, 1982).

When the initiator of an investment was an enterprise the decision to undertake it had to be made by direct vote of all BOAL employees. Even in those cases, however, political intervention permeated the investment decision-making process. Investment was regulated by, literally, dozens of laws and regulations specific to each region (R. Brkljač et. al., 1988). In general, various agencies had to be satisfied that the project met technical and other criteria. Most importantly, as a safeguard against the insatiable hunger for investment that characterized the system, an enterprise or group of investors needed to prove that it had secured the necessary financing in order to undertake an investment. It had to show that specified sums had been blocked on special SAS accounts and that future streams of earnings on other accounts would be available for financing the investment in the future. Assessment of whether the financing had been secured was made by the SAS. More intrusive regulation also existed. for example, in Slovenia in 1982 special commissions made up of government representatives, the SAS, banks and a Chamber of Commerce had to confirm the "socio-economic justification" of an investment (R. Brkljač et al., 1988).

Any infrastructure undertaking surpassing the financial strength and territorial horizons of a commune required the pooling of capital and, consequently, the coordination that only the regional patronage network could provide. Regional authority over the aforementioned funds in combination with their regional policy-makers' position in the system of social planning made regional governments, together with the large regional banks, central to the mobilization of capital across communal borders. The organization of banks insured that their position vis-à-vis the regional authorities was one of partnership rather than rivalry. They, like large enterprises, operated with considerable autonomy, but they were expert partners within the regional patronage network. In sum, we can conceive of the

investment process as a collective effort—for small projects at the communal level, for large projects at the regional level—unmistakably tied to a territory and giving birth to institutions that remained intimately bound to the territorial unit that had founded them.

3.5.4 The Absence of the Federation

Whether the absence of the Federal government from economic investment decision-making in the 70s mattered for "capacity duplication" across regions or not, is debatable. Several accounts about investment allocation in the 1960s suggest that even when the Federation had been involved, it had been so sensitive to regional pressures that it supported with its financing the duplication of projects across regions.[23]

A truly disintegrative effect of the removal of the federal government from the investment allocation process, however, came through the effect it had on the development of transportation infrastructure. By the early 1970s, even when Federal level institutions were charged with responsibilities concerning the construction, maintenance and financing of inter-regional links these were executed by coordinative bodies with no autonomy or authority over and above regional institutions. The requirement that all and every project be executed by harmonized action of the regions appears to have led to paralysis in the development of inter-regional links even when financing was secured from international organizations such as the IBRD.

While the systemic problems were often quoted in the press and academic literature alike (e.g. see Dragisic D. et al., 1984), we are not aware of a study that would have

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[23]See, for example, P. Shoup (1968).

quantified the effects that this paralysis had on the development of inter-regional communications. However, anecdotal evidence clearly suggests that over the period of our analysis there was very little growth and improvement in inter-regional road links, while the operation of the rail system possibly regressed.

3.6 Investment Structure and Protection

The territorialization of capital accumulation by itself would not have led to reduced levels of trade. On the contrary—well known results from the theory of international trade whereby capital immobility results in higher levels of trade—could apply to the Yugoslav case as well. However, territorialization of capital accumulation might have been key to a DG pattern of growth in view of the fact that once bad investments were made, for whatever reason, they were seldom allowed to fail.

Consider that "capacity duplication", that is, the construction of a new capacity when existing facilities suffice to satisfy the market, happens for whatever reason. Then, if the enterprise exit process is obstructed parallel capacities become indefinitely sustained, a feature of the economy. Neither "capacity duplication" nor the persistence of such excess capacity was specific solely to former Yugoslavia. "Capacity duplication" is, in fact, a necessary ingredient in the articulation of discipline of the market as new aggressive entrants coexist with less efficient producers before the latter are forced out of the market.[24]

However, with a territorialized decision making process, "capacity duplication" will happen across, not within, territorial units. For example, if a specific industry becomes

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[24]For an example of large scale, wasteful capacity duplication in a capitalist economy, recall the notorious construction of parallel railways in XIX century U.S.

particularly profitable, several centers of investment decision-making—in our case, territorial units—may respond by expanding capacity in that particular activity, possibly resulting in excess capacity. Or if policy-makers had a particular bias in favor of certain industries considered particularly important for economic development, again, such industries would appear repeated across territorial units. Not only would there be four steel mills in an economy whose demand could be amply satisfied by one, but each one of the steel mills would be located in a different region (and similarly, for example, with textile factories in local communities). Inevitably, this would lead to import-substitution by regions investing in the new activity from regions where such capacities were already in place.

Clearly, to maintain such inefficient capacities in place, some mechanism of protection was needed. First, all industries were heavily protected from competition from abroad. Second, key to the maintenance of inefficient enterprises were the mechanisms of financial assistance and implicit subsidization that we described above. Third, protection was also aided by the weakness of competitive forces and by instruments of explicit protection wielded by their parent territorial units.

The unity of the Yugoslav market in the early 1980s was safeguarded by no less than 16 laws (M. Rokvic, 1983b). Most of them were aimed against monopolistic and collusive behavior and, given the circumstances, were utterly ineffective. However, there is no question that the former-Yugoslav polity did not use explicit tariff-like trade barriers, or other explicit fiscal charges to protect its market. Rather, barriers to trade were based largely on the weakness of the drive to earn profits by competing enterprises and, particularly, the weakness of trade intermediation. The most important element weakening competitive forces

was that the retail and wholesale network was underdeveloped and dependent on the very industries whose goods it was supposed to put under competitive pressure.

Until the late 1980s, commerce was closed to the private sector. Wholesalers and retailers were organized into BOALs like most other firms, but were heavily dependent on industry for working capital and were even more heavily regulated than industry. Often, they were just outlets for the firms whose products they sold. For example, in 1983, 46.8 percent of all retail stores were owned by producers of the goods sold, and they accounted for 31.7 percent of retail sales for that year (S. Lovreta, 1986).

Protection and control of commerce primarily at the local level led to a very diffuse trade network from the national perspective: in the early 1980s, the ten largest retail firms accounted for only 3 percent of total retail sales, and ten percent of the largest firms accounted for only one-third of wholesale sales. Compare these figures with, for example, those for Germany where in the early 1980s the ten largest retailers accounted for 15 percent of retail trade, and 4 percent of the largest wholesalers accounted for 60 percent of all wholesale trade (S. Lovreta, 1986). The diffuseness in former Yugoslavia was not a sign of competitiveness, because trade tended to be highly concentrated at the local level; according to a federal government report in 1988, 50 percent of all communes had only one commercial enterprise on its territory (*Vjesnik*, 12/12/1988). By virtue of all these circumstances, trade intermediaries were, on the buying end, an extended arm of industry and, on the selling end, virtual monopolists. Such intermediaries clearly could not be very effective agents of market integration, and this, in turn, facilitated protective behavior.

Communes could rely on several instruments to take advantage of weak intermediation and effectively serve local protection. One was their authority over licencing

of commercial operations and rental of commercial space. For example, in the town of Vršac, in 1986, the SIC for housing and urban development evicted all out-of-town WOs leasing space from the SIC and offered them other space at a higher price. The SIC offered the explanation that these enterprises paid low rents considering that all the income they generated was siphoned off to other localities. Another example cited in the press—Serbia's largest department store chain, *Robne kuće Beograd*, was refused space in Kruševac, a town in Serbia, because the town's retail trade was in the hands of *Kruševac-Promet*, a company formed by the merger of four local commercial enterprises—underscores that this kind of protection was indeed practiced at the commune level.

More extreme methods relied on the lack of separation of governmental powers and territorialization also of the police, which tended to make law enforcement a local service in the commune. For example, the local police on direct appeal from *Vino-Župa*, a local wine maker, stopped out-of-town competitors from buying grapes from local growers. Or, consider the example of passengers being transferred by the police of one commune from busses of a line headquartered in another commune to busses of their own commune's line. The two bus lines, ironically, were associated in the same COAL.[25]

Communes also appear to have exerted pressure on local subsidiaries of enterprises headquartered in other territories to spin-off as independent BOALs. The aim was not just to gain control over the subsidiary, but also to gain the right to tax it (S. Lovreta, 1986). One effect of such pressures was the fear of spin-off, which undermined any incentive for commercial enterprises to expand their retail networks beyond territorial boundaries.

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[25]All three examples are cited in a Belgrade *Borba* article (August 26, 1986).

All these pressures and discriminatory actions were illegal, and there are claims that they were practiced widely and with impunity. However, reports of such behavior being prosecuted also exist, and these reveal that with persistence the difficulties could be overcome. The case of the evictions in Vršac was reported by the federal market inspection, but the local and district public prosecutors found "no grounds" for legal action. The federal public prosecutor did, however, eventually intervene, and legal action followed.

The instruments of protection that we have described were largely in the hands of communes. It is questionable whether explicit protection occurred at the regional level, and, if so, to what extent. There is anecdotal evidence of regions investing in the production of strategic inputs and fostering in this way the creation of vertically integrated regional economies. Nonetheless, the pressure on domestic enterprises to buy, for example, such inputs domestically, to buy surplus production from domestic producers, or to keep sellers from other regions out, is not likely to have been a regular occurrence. It is likely, however, that regional boundaries represented greater obstacles to trade than communal boundaries; an enterprise attempting to penetrate the market of a commune in the same region could always appeal for help to the regional patronage network. There was no one to appeal to at the federal level.

A newspaper survey conducted in 1988 (in reaction to the increasing stridency of nationalist accusations in Serbia of protectionist behavior in other regions) suggests that indeed, protection was based more on weakly competitive behavior by economic agents than on any explicit barriers to trade (*Privredni Pregled*, 02/04/1988). The authors report enterprise statements to the effect that when their goods met the quality requirements, nationwide placement could not be denied, and statements by trade firms that they could and

did intermediate across territorial boundaries when they were ready to take margin cuts. These responses suggest that penetration of markets outside one's own territory was more a matter of readiness to abandon the coziness of one's own market, than a matter of overcoming obstacles to trade. Barriers could be overcome when the agents were willing to behave competitively.

Note that while protection would have insured the success of any deliberate import-substituting investment structure, the Yugoslav institutions insured that "capacity duplication" would have happened even without any deliberate import-substitution.

Price controls and barriers against foreign trade tended to favor some industries substantially more than others, regional variation notwithstanding. In addition, factor prices across different regions did not adequately reflect differences in factor endowment. FAD financing and federal budget transfers rendered capital in less-developed regions cheaper than would be warranted by the relative labor/capital endowment. As perceived by enterprises, the tradeoffs were similar, and, in the absence of perfect foresight, it was rational for the agents to chose similar investment allocations. What is more, in some cases the benefits of distortionary policies might well have been so large as to compensate for any losses from insufficient exploitation of economies. In those cases, excess capacity would have been created even if the selection of allocations had been made with perfect foresight.[26]

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[26]Lydall (1984) also suggests this possibility.

CHAPTER FOUR

REGIONAL TRADE IN FORMER YUGOSLAVIA: STYLIZED FACTS AND A CORE MODEL OF REGIONAL TRADE

The empirical analysis conducted in the subsequent two chapters is based on the analysis of the bilateral sales between the regions of former Yugoslavia in every even year of 1970–1980 and in 1983 and 1987. Because the stylized characteristics of regional trade in former Yugoslavia have been little studied, and none of the available studies presents a coherent picture of the trade levels and characteristics of Yugoslav regional trade in this period, we present in this chapter an overview of the data.[27] The available figures on bilateral and intra-regional trade include cross-hauling, as well as some double-counting, and are therefore not strictly comparable to figures on international trade.[28] Cleaned up data, fully comparable with the concept of exports in international trade are available for only two years. We present the openness of the regions to inter-regional and foreign trade, based on the cleaned up trade figures for 1980, in comparison to that of selected countries and the regions of the U.S. Further, we present a matrix of regional flows for 1987. And lastly, we

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[27]Uvalic, 1993 presents this data set, with the exception of some years. Analysis of the tendencies in inter-regional trade has not been conducted, to our knowledge, to date.

[28]For a detailed description of the data set, see Appendix I.

present the aggregate regional sales to/from the rest of the country (ROC) for the eight available years. The matrix and the eight years of flows are presented based on the original, un-cleaned up, data set.

The discussion of the observed stylized characteristics of intra- and inter-regional flows introduces a discussion of a general model of regional trade that is used as the starting point in the empirical analysis conducted in the subsequent two chapters.

4.1 Inter-Regional Trade Levels

Table 4.1 gives the cleaned-up regional deliveries to the rest of the world (ROW), that is, both to the rest of the country (ROC) and to foreign countries, in Yugoslavia in 1980. Exports of a set of small countries, in 1987, and the deliveries of the nine US census regions to the rest of the USA, in 1963, are also provided in Table 4.1 for comparison. The figures for the former-Yugoslav regions are given as the share of their hypothetical GDPs;[29] those for the selected countries are given as the share of their GDPs; and those for the US census regions, as the share of regional value added.

In 1980, deliveries by the former-Yugoslav regions to the ROW were between 57 percent (Croatia) and 85 percent (Slovenia) of their hypothetical GDPs. These shares are roughly comparable to the GDP share of total exports of two of the most open EEC economies: Ireland (63 percent) and Belgium (69 percent). In the case of the former Yugoslav regions, their ROC deliveries were around three-quarters of their ROW deliveries, with the share of ROC in ROW declining to two-thirds by the end of the period.

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[29]Hypothetical GDP = 1.13 * GMP, see Appendix III.

Table 4.1. Regions of Former Yugoslavia—Trade Openness: Comparisons with Selected Countries and US Census Regions

Country	Deliveries to ROC[1] (% hypoth. GDP)	Exports to ROW[2] (% hypoth GDP)	Pop. x 10^6 1987	Exports (% GDP)	Deliveries to ROC[1] (% value added)
Former-Yugoslav Region (1980)					
Bosnia-Herzegovina	52.7	68.2	4.4		
Croatia	44.6	56.8	4.7		
Kosovo	47.8	62.4	1.9		
Macedonia	61.0	72.8	2.1		
Montenegro	56.0	66.5	0.6		
Serbia proper	47.2	61.9	5.8		
Slovenia	47.8	84.9	1.9		
Vojvodina	69.6	80.0	2.1		
Countries (1987)					
Belgium			9.9	68.6	
Austria			7.6	37.7	
Denmark			5.1	32.7	
Finland			5.0	24.6	
Israel			4.4	36.1	
Ireland			3.5	63.0	
New Zealand			3.3	28.4	
Uruguay			3.1	22.1	
Singapore			2.7	160.1	
US Region (1963)			...		
New England			...		67.3
Middle Atlantic			...		59.5
East-North Central			...		62.2
West North Central			...		76.0
South Atlantic			...		59.0
East South Central			...		85.3
West South Central			...		56.6
Mountains			...		65.3
Pacific			...		27.1

Sources: Former Yugoslav region, Miljkovic, ed. (1986) and FBS foreign trade statistics; countries, IFS; and US Region, Polenske (1980).
[1]Rest of country.
[2]Rest of world (for former-Yugoslavia includes deliveries to other regions).

Analogously, approximately two-thirds to three-quarters of exports by the EEC countries stayed within the EEC in 1987, but the proportion was growing. The hypothetical regional GDP share of former-Yugoslav regional ROC deliveries ranges between 45 percent and 70 percent, somewhat lower than those for the US census regions, which ranged between 57 percent (West South Central) and 85 percent (East, South Central region) of each region's value added. The Pacific region was an outlier with only 27 percent of its value added sold in the rest of the country.[30]

The data in Table 4.1 suggests that the openness and interdependence of the former-Yugoslav regions were similar to that of a highly integrated group of national economies, such as those in the EEC, but possibly lower than would be expected of an integrated national economy. The possibility that the integration was less than one would expect of regions within a national economy is suggested by the fact that the US census regions traded a larger portion of their outputs among themselves than did the regions of former Yugoslavia, even though they were vastly larger. However, comparisons with more countries would be necessary to form a standard of "normal" trade within a national economy. The only other estimate that we are aware of is that for Quebec which traded one-third of its GDP with the ROW in 1973 (A. Anastasopoulos and W. Sims, 1983). A comparison of the case of Quebec and the U.S. Pacific region with other U.S. regions suggests that variations, in the openness of regions can be large.

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[30]Polenske (1980), the source from which the figures for the US census regions were calculated, does not provide data on regions' exports abroad. Total US exports at the time amounted to approximately 10 percent of GDP.

Table 4.2. Regions of Former Yugoslavia—Bilateral Sales Matrix (1987)
(Percent Share of Seller Region GMP)

	Buyer Region								Total ROC[1] sales	ROC sales/ hypoth. GDP
Seller Region	Bosnia-Herzegovina 1	Montenegro 2	Croatia 3	Macedonia 4	Slovenia 5	Servia Proper 6	Kosovo 7	Vojvodina 8	9	10
Bosnia-Herzegovina	180.7	2.5	15.7	2.8	8.6	16.1	1.3	4.6	51.5	45.6
Montenegro	11.9	140.6	6.5	4.5	3.9	24.5	5.3	4.6	61.2	54.1
Croatia	11.2	1.8	177.9	2.6	15.8	12.1	1.0	5.1	49.6	43.9
Macedonia	6.9	3.0	12.1	181.8	8.7	24.1	5.0	4.3	64.2	56.8
Slovenia	9.0	1.3	27.5	3.3	184.2	18.1	1.1	4.7	64.9	57.4
Serbia proper	9.7	3.9	11.8	5.9	8.0	192.4	4.2	10.4	54.0	47.8
Kosovo	1.0	2.9	5.2	7.9	6.0	21.7	141.0	2.7	52.3	46.3
Vojvodina	10.6	2.1	15.5	4.3	8.9	38.1	2.0	164.7	81.5	72.1

Source: unpublished FBS data (see Appendix III).
[1]Rest of country.

4.2 The Matrix of Bilateral Trade

Table 4.2 is a matrix of bilateral regional sales in terms of seller-region GMPs for the former-Yugoslav regions in 1987. The organization of the matrix is analogous to that of an input-output table: the delivering regions are given by rows, while the recipient regions are in the columns. The aggregate of regional sales to the ROC (the sum of the off-diagonal elements in each row) are given in columns 9 and 10, respectively as a share of regional GMPs and the hypothetical GDP.

One salient feature of the data is that the elements on the diagonal of the matrix, intra-regional sales, are nearly an order of magnitude larger than any bilateral flows, and about three to four time larger than regional sales to the ROC. Total regional sales to the ROC ranged between 40-80 percent of the seller region's GMPs, or 35-70 percent of the hypothetical regional GDPs. Intra-regional sales ranged between 141 percent of GMP for the two smallest regions, Montenegro and Kosovo, and 192.3 percent for the largest region, Serbia Proper. There is a clear correlation between the size of the region and the proportion of intra-regional sales to GMP.

It is interesting to note that there is also an apparent correlation between the proximity of regions and the size of their bilateral trade. In fact, two trading blocks can be distinguished: the northern block, consisting of Slovenia and Croatia; and the southern block, consisting of the three components of Serbia—Serbia Proper, Kosovo and Vojvodina—and Macedonia and Montenegro. Bosnia-Herzegovina, centrally located in the country, appeared to trade evenly with both trading blocks.

4.3 Regional Trade Over Time

Figures 4.1, 4.2, and 4.3 give, respectively, sales to the ROC, regional purchases from the ROC, and within-regional sales as a share of GMP for each former-Yugoslav region over the observed years. As a share of GMP, regional sales and purchases fluctuated, but a slight negative trend can be detected for all regions other than Macedonia between 1970-1983 and a sharp decline in trade is observed for all in 1983–87. In absolute terms, real regional sales and purchases, both within and between regions increased in every observation between 1970 and 1983, but then dropped, in 1987, to the 1978 level (not shown). It is possible that part of the decline in 1987 was caused by organizational or accounting changes in commerce. (See Appendix III).

The trade indicators used to support the claims that the country was disintegrating were simple ratios of intra- and inter-regional trade in this data-set.[31] A simple visual comparison of the progress of inter- and intra-regional trade in figures 4.1 and 4.2 shows that their ratio was declining. However, these figures are not comparable because organizational changes in the economy in this period significantly inflated recorded intra-regional sales relative to inter-regional sales. This inflation peaked in the early 1980s and was somewhat, but not fully reversed thereafter.[32] (In our analysis in Chapter Five where we compare the determination of inter- and intra-regional flows we construct a special variable to control for the effects of industrial organization.)

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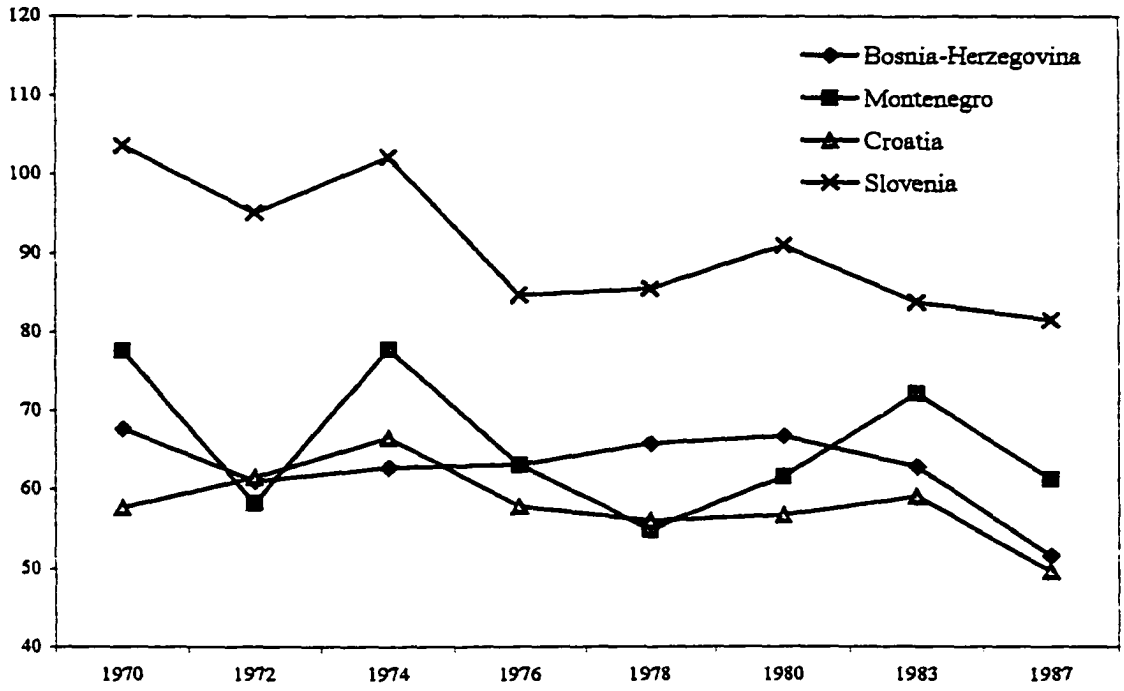
[31]See, for example, Ocić, Č. (1983), *Proceedings from Conference* (1982), Rodić, M. (1980). *Yugoslovenski pregled*, 1988, and OECD *Economic Survey of Yugoslavia*, 1989.

[32]Kedžić, Lj. and Bešević M. (1982) mention the possibility of the comparison being tainted by the organizational changes. The organizational changes are explained in Appendix III.

Figure 4.1. Former Yugoslavia: Inter-regional Sales, 1970–87
(Share in Regional GMP)



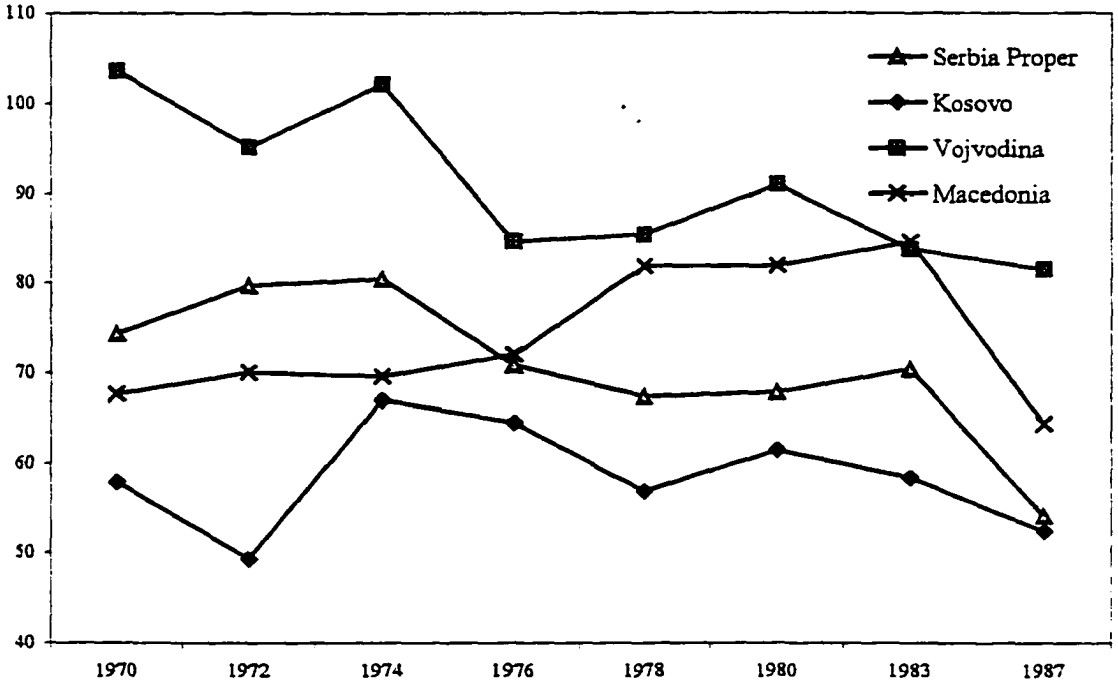
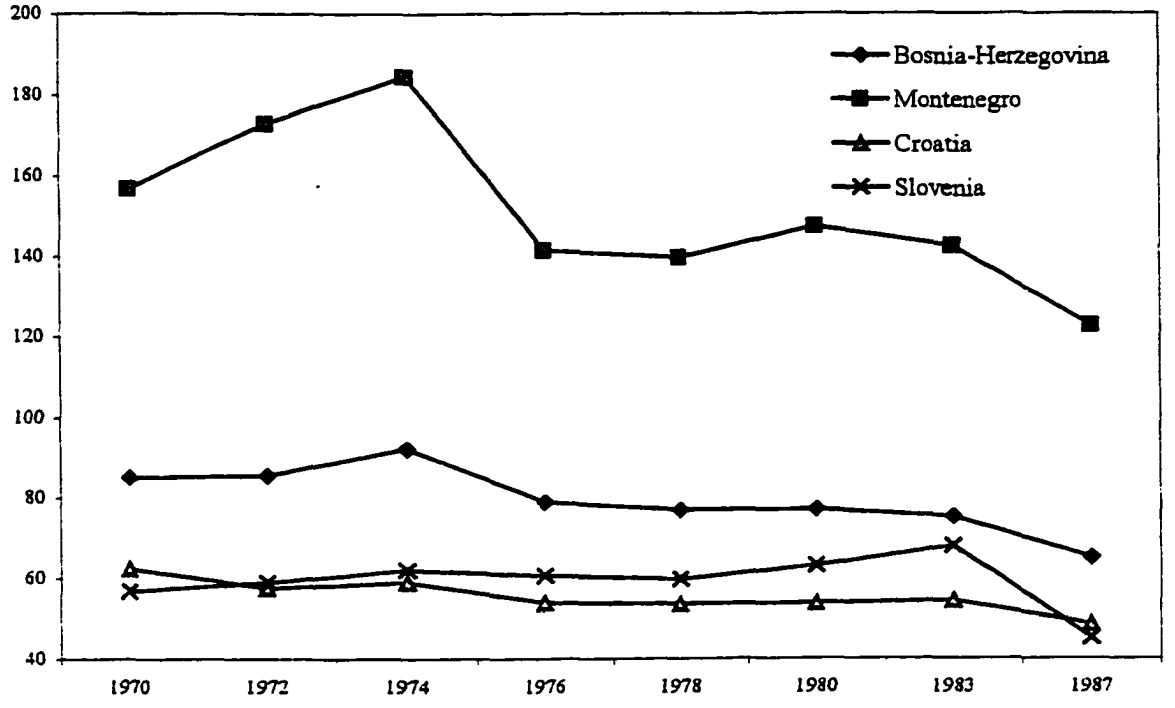


Figure 4.2. Former Yugoslavia: Inter-regional Purchases, 1970–87
(Share in Regional GMP)



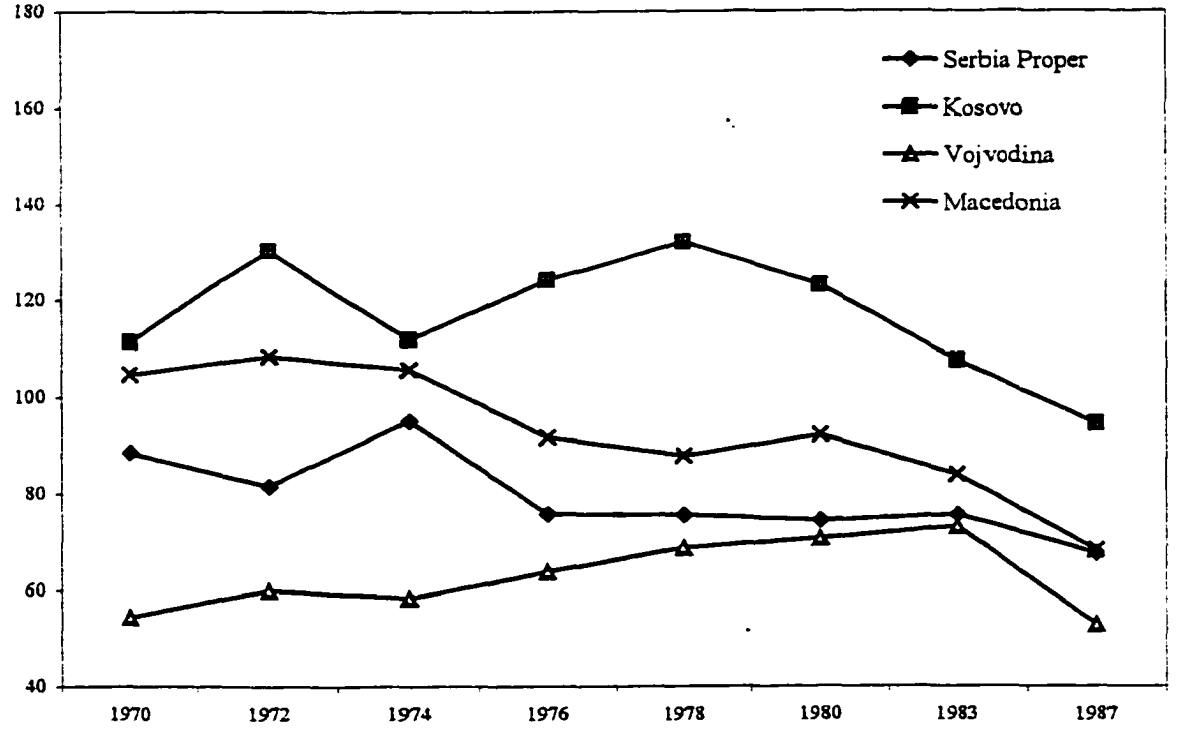
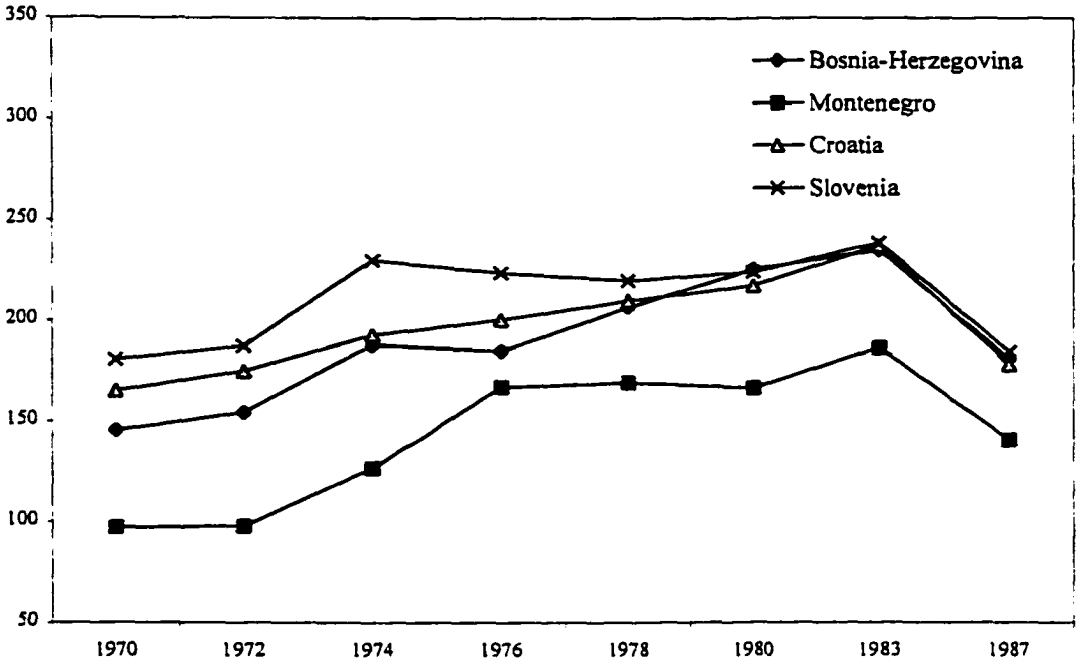
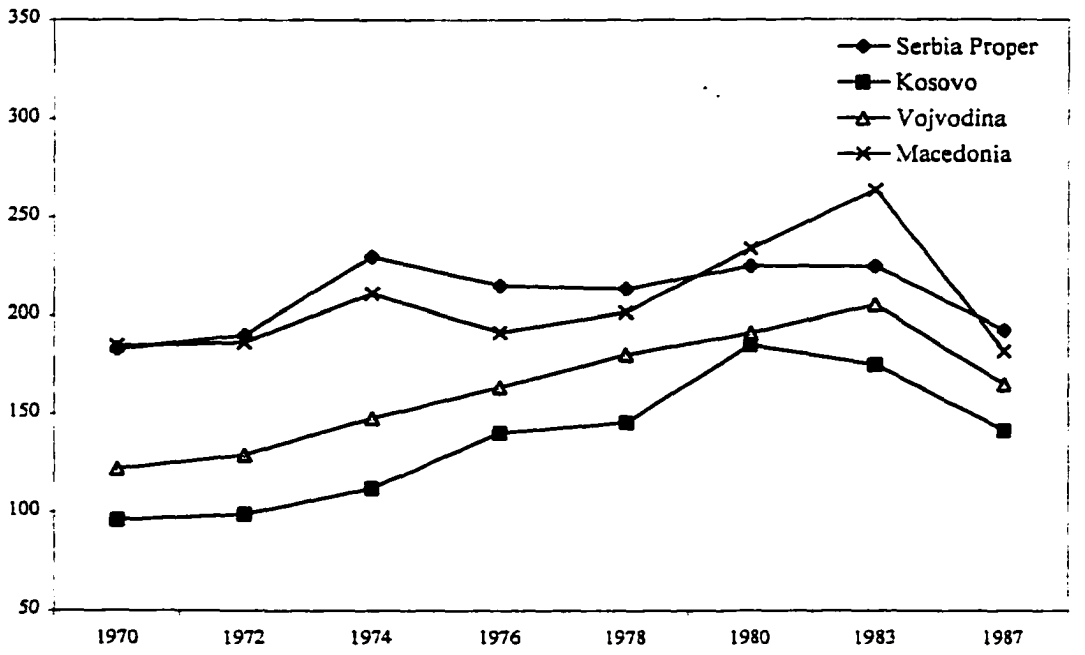


Figure 4.3. Former Yugoslavia: Within-regional Sales, 1970–87
(Share in Regional GMP)





It is interesting to note a relatively marked simultaneity in the fluctuations of all the flows, suggesting that macroeconomic factors common to all regions affected the regional flows, as would be expected of a national economy. It is also interesting that inter-regional flows show a tendency of decline relative to GMP. Numerous factors could explain it—for example, a decline in foreign transfers to the economy may have lead to an overall improvement of the external trade balance on account of a general decline in domestic trade. Or, it may simply be the consequence of a gradual decline in double counting or cross-hauling in the data caused by, for example, changes in the organization of commerce. Finally, it could be the result of the disintegrative impact of the institutional changes of the early 1970's.

In the following section we build a generic model of regional trade determination that helps us organize the analysis of this factors, and then extend the empirical analysis to the comparison of inter-regional and intra-regional trade determination in Chapter Five, and the analysis of the link between production structure and inter-regional trade in Chapter Six.

4.4 A Generic Model of Regional Trade Determination

The extreme simplification of the assumptions used in the development of the illustrative model in Chapter Two helped us abstract from the macroeconomic factors that are usually the focus of the analysis of trade determination analysis: prices, incomes, and the availability of production factors. This helped us focus on one factor that is usually assumed away, the effect that the complementarity of production structures has on the level of trade between regions. Presently, we develop a generic model of regional trade determination that incorporates both the structural and macroeconomic factors. For the time being, we adopt the

standard assumptions of full employment, equilibrium in product and factor markets (including foreign trade), and production in the region of decreasing returns to scale.[33] Assume for simplicity that the economy consists of two regions. Assume further that each region produces one good, but that there is product differentiation so that there is no perfect substitution between the variants of a good produced by a region as sold on either of the two regional or the foreign market. Denote each variant of a good by two letters/numbers, the first standing for its region of origin, and the second for its destination. That is, let *ij* denote the variant of commodity *i* sold by region *i* to region *j*, where $i = 1,2$ and $j = 1,2$, and denote by *ie* the variant of good *i* exported by region *i*. Finally, denote by *mi* the foreign good imported by region *i* (this could be completely different from *mj*, the good imported by region *j*). As there are two regions,there are four domestic flows, X_{11}, X_{22}, X_{12} and X_{21},[34] each representing the equilibrium solution between the supply X^s_{ij} and demand X^d_{ij} for the flow *ij*. In addition, there are four foreign trade flows, X_{1e}, X_{2e}, X_{m1} and X_{m2}.

The three goods *ii*, *ij* and *ie* are substitutes in production, that is, a transformation function between the three differentiated goods produced by region *i* is given by its factor endowment, available labor (L_i) and capital (K_i), and by the available technology (A_i). These, together with the relative F.O.B. prices of the three goods, determine the supply of good *ij*

$$X^s_{ij} = S(K_i, L_i, A_i, P_{ii}, P_{ij}, P_{ie}) \qquad \begin{matrix} i = 1,2 \\ j = 1,2 \end{matrix} \tag{4.1}$$

where P_{ii}, P_{ij}, and P_{ie} stand for the F.O.B. prices of the respective goods.

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[33]Decreasing returns to scale may seem to contradict the implications of the model developed in Chapter Two. However, as long as there are fixed costs to the establishment, entry and exit of industries, the implication that the extent and nature of regional specialization at a point in time matters for the resulting trade levels is still valid. This proposition is all we need for the present analysis.

[34]Time subscripts are suppressed for simplicity.

The three goods *ij*, *jj* and *mj* are substitutes in consumption. Region *j*'s total domestic demand (X_j^d) is determined by its disposable income (Y_j). The regional distribution of region *j*'s demand is determined by the domestic prices (exclusive of transporation costs) of the two goods that region *j* purchases on the domestic market, (P_{ij} and P_{jj}), transport costs for those two flows (T_{ij} and T_{jj}), by the price of imports, P_{mj}, (inclusive of transport costs) and by preference parameters (B_{ij}).

The preference parameters may be thought of as representing consumer tastes, but assuming that consumers were relatively similar across the regions this interpretation is of lesser importance. More importantly, B_{ij} is determined by the complementarity of regional production structure. In a two region framework, B_{ij} can be thought of as the extent to which the production structure of region *j* allows for self-sufficiency. A highly specialized region, other things equal, will require more purchases from the rest of the country. In a framework with more than two regions *Bij* is linked to the complementarity of regional production structures. Say that region *j* produced few investment goods; then, other things being equal, *j* would "prefer" the good (*ij*) of a region *i* with a higher share of investment goods in its output than the good (*kj*) of region *k* with a lesser share of investment goods in its output.

Assume for the sake of simplicity that $T_{jj} = 0$. Then,

$$X_{ij}^d = d(Y_j, B_{ij}, T_{ij}, P_{ij}, P_{jj}, P_{mj}) \qquad \begin{matrix} i = 1,2 \\ j = 1,2 \end{matrix} \tag{4.2}$$

Note that there is no cross-price effect between the two goods sold within the regions (*ii* and *jj*) nor between the two goods that a region is buying and selling in interregional trade (*ij* and *ji*), since these do not both enter the supply or demand of either region.

Solving out the *ij* supply and demand functions for the price P_{ij}, gives us semi-reduced forms determining the four domestic flows:

(4.3a)
$$X_{12} = f(K_1, L_1, A_1, Y_2, B_{12}, T_{12}, P_{22}, P_{11}, P_{1e}, P_{m2})$$
$$X_{11} = f(K_1, L_1, A_1, Y_1, B_{11}, T_{11}, P_{21}, P_{12}, P_{1e}, P_{m1})$$
$$X_{22} = f(K_2, L_2, A_2, Y_2, B_{22}, T_{22}, P_{12}, P_{21}, P_{2e}, P_{m2})$$
$$X_{21} = f(K_2, L_2, A_2, Y_1, B_{21}, T_{21}, P_{11}, P_{22}, P_{2e}, P_{m1}).$$

Note that each semi-reduced form includes two domestic cross-price effects and two foreign cross-price effects, in addition to the determinants of the supplying region's overall supply and the buying region's overall demand.

To denote the general form of the semi-reduced function of a domestic flow we need to introduce two more notational conventions: denote with *k* a region other than region *i*; and denote with *s* a region other than region *j*. Then:

(4.3b)
$$X_{ij} = f(K_i, L_i, A_i, Y_j, B_{ij}, T_{ij}, P_{kj}, P_{is}, P_{ie}, P_{mj}) \quad i = 1,2;\ j = 1,2;\ k = 1,2 \quad k \neq i;\ \therefore\ s = 1,2 \quad s \neq j.$$

The fact that the functional form f in (4.3b) is the same for both intra- and inter-regional flows reflects the assumption that any technological, geographic and taste factors and parameters differentiating the two regions are subsumed in either A_i or B_{ij}, and that they affect regional supply and demand regardless of whether they pertain to one or the other region. In other words, the effect of each factor, say K_i, on a flow is the same (expressed by *f*) whether it concerns good *ii* or good *ij*. All the factors listed in the function $f(\cdot)$ are assumed to have the same effect on the supply of or demand for a good, regardless of the good's regional origin.

Should the institutional differentiation between the two regions be such that demand for, or supply of, a flow are affected by the mere fact of it being intra- or inter-regional, the function f will need to differ for intra- and inter-regional flows. First, we might assume that each factor operates in the same way in the case of intra- and inter-regional flows but that there are additional (actual or perceived) costs/risks in inter- as opposed to intra-regional transactions. These costs would affect the flow X_{ij} $i \neq j$ much as transportation costs do. Assuming for the sake of simplicity that the additional transaction costs are uniform across all inter-regional flows, they can be represented by ΠZ where Π is the cost/premium on inter-regional transactions and Z is a variable that takes the value of 1 when $i \neq j$, and zero when $i = j$. Equation (4.3b) then becomes

(4.4a) $$X_{ij} = f(K_i, L_i, A_i, Y_j, B_{ij}, T_{ij}, P_{kj}, P_{is}, P_{ie}, P_{mj}, \Pi Z) \qquad \begin{array}{ll} & i = 1,2 \\ & j = 1,2 \\ k = 1,2 & k \neq i \\ s = 1,2 & s \neq j \\ \text{if } i = j & Z = 0 \\ \text{if } i \neq j & Z = 1 \end{array}$$

Second, a preference for intra-regional trade could also be expected to affect the parameters of the supply and demand factors themselves. The fact that regional patronage networks and social planning facilitated information exchange, market transactions, and coordination of production decisions among economic agents within a region would usually be thought of as costs external to the technology of an individual enterprise. However, regarding the region as a whole, we can consider them as one more determinant of the aggregate production and demand functions. Similarly, if investment decisions were guided by the goal of import-substitution from fellow regions, or if purchase decisions were affected

by an irrational preference for intra-regional flows, such biases would also affect the parameters of the regional supply and demand functions.

In general, we would expect that the effect of an increase in supply factors, K_i and L_i would have a larger positive effect on intra- than on inter-regional flows. Similarly an increase in disposable income or import prices would lead to a larger increase in demand for intra- than inter-regional flows. An increase in export prices would lead to a greater decline in the supply of inter- than intra-regional flows. Denote the functional form that describes the demand for intra-regional flows with f^0 and that for inter-regional flows with f^1. Then,

$$(4.4b) \qquad X_{ij} = f^{\sim}(K_i, L_i, A_i, Y_j, B_{ij}, T_{ij}, P_{kj}, P_{is}, P_{ie}, P_{mj}, \Pi Z) \qquad \begin{array}{l} i = 1,2 \\ j = 1,2 \\ k = 1,2 \qquad k \neq i \\ s = 1,2 \qquad s \neq j \\ \text{if } i = j,\ Z = 0 \\ \text{if } i \neq j,\ Z = 1. \end{array}$$

Third, in principle, the functional form $f(\cdot)$ may be identical for inter- as well as intra-regional flows but if the regional economies progressively despecialized and this was associated with a decline in inter-regional trade, this would be reflected in a particular pattern of change of the B_{ij}'s and of their association with the flows—presenting evidence of regional import-substitution with respect to domestic trade. A general tendency towards import-substitution among all the regions would be strongly suggestive of disintegration.

The empirical test in Chapter Five is a test of the equality of f^0 and f^1 and of the existence of a price-wedge Π, the first two of the manifestations of economic segmentation described above. We establish a regression system consisting of two sub-systems, one— sub-system 0—for intra-regional flows, and the other—sub-system 1—for regional sales and purchases to/from the rest of the country. We join the two systems in a Seemingly Unrelated

Regression (SUR) and test, factor by factor, the hypothesis of equality of their effect in intra- and inter-regional flows. Clearly, unequal effects do not automatically represent a bias for intra-regional flows. The expected pattern of differentials is discussed later in the text. The empirical test in Chapter Six is focused only on the determination of inter-regional flows. It tests for the third manifestation of disintegration—the presence of import-substitution in inter-regional trade—by developing a measure of complementarity of industrial structures and analyzing its association with inter-regional flows. In both chapters the actually implemented model needs to be adapted to the stilized facts of the former Yugoslav economy and the availability of data.

CHAPTER FIVE

TRADE IN FORMER YUGOSLAVIA: WAS THERE AN INTRA-REGIONAL TRADE BIAS?

The representation of the determination of inter-regional trade in former Yugoslavia would need to incorporate several complex and disparate features. First, the model would have to incorporate all the general equilibrium characteristics of the generic model we presented in the previous chapter. Next, the rest of the world would have to be modeled as two regions, because the characteristics of Yugoslav trade with countries where payments were made in hard currency ("hard-currency area") and with countries where payments were made through bilateral clearing ("clearing area") differed widely. Finally, the model would need to incorporate at least some non-competitive or non-equilibrium features of the Yugoslav economy, lest should estimated relationships be misinterpreted. For example, trade with the hard-currency area was perennially not in equilibrium, as the exchange rate was chronically overvalued. It is also inadequate to assume that full employment prevailed on the domestic market.

In sum, the representation of the economy has to at the very least assume the existence of a minimum of four goods (two domestic and two foreign ones), and do justice

to some market distortions. Since an analytical model with all these features would not be manageable, we adopt an eclectic approach adapting the generic model described in the previous chapter to the Yugoslav reality and to the availability of data.

5.1 The Implemented Model

In this section we incorporate some stylized facts of Yugoslav foreign trade, discuss the treatment of unobserved variables, introduce a control variable for the effect of industrial organizational changes that happened over the period of analysis, and discuss the problems introduced by the method applied to estimate regional disposable income.

5.1.1 Foreign trade

5.1.1.1 Trade With Hard-Currency Areas

The key stylized fact of trade with the hard-currency area is that a perennially overvalued dinar kept the notional demand for imports consistently in excess demand. The external balance was kept within the limits of available financing by powerful trade barriers, export incentives and ever-changing methods of foreign-exchange rationing. It would be inadequate, therefore, to consider P_{mj}, the pecuniary cost of the good imported by region j, as the opportunity cost of obtaining the imported good.

However, the Yugoslav system was too decentralized to assume that this was a system of central allocation of foreign exchange, implying that imports from hard-currency areas were an exogenously determined variable. The availability of foreign exchange to an agent or region was largely determined by the level of their foreign exchange earnings

(exporters were allowed to retain a portion of their foreign exchange earnings) and by borrowing, (commercial bank borrowing from abroad was possible, even if heavily regulated). Moreover, regions negotiated among themselves some re-distribution of foreign exchange earnings, especially of funds borrowed by the federation from aid organizations. Finally, the allocation of surrendered foreign exchange earnings was negotiated among industries within the regions. Therefore, from the agent's perspective, additional foreign exchange could be always obtained, but at the cost of additional lobbying, complex semi-legal financial operations linked to payments in foreign exchange, or losses entailed in otherwise unprofitable exports of own production.

To capture this fact, we build an illustrative model of the determination of foreign trade with the hard-currency area in former Yugoslavia using the device of a shadow price for foreign exchange. We consider foreign exchange as a commodity itself, which allows us to introduce a wedge between the observed pecuniary price of foreign goods (at the official nominal exchange rate) and the cost/benefit entailed by obtaining/selling a good in foreign trade. We can think of the shadow price as the effort—political economic and pecuniary—that an agent had to expend to obtain an additional unit of foreign exchange.

Assume that there is only one integrated national economy. Further, assume that, given domestic demand conditions the demand for imports is solely a function of the cost of the imported good as perceived by economic agents. This cost, in turn, is the multiple of the shadow price of foreign exchange and the foreign import prices. Denote the shadow price of foreign exchange (measured in units of the domestic good) by P_f. Denote, further, the

demand for hard-currency imports of the country by X_{mh}^{d}. Then, the country's demand for hard-currency imports is given by

(5.1) $$X_{mh}^{d} = m(P_m^{w} P_f, DD)$$

where P_m^{w} is the import price in foreign exchange and DD is an umbrella term for domestic demand conditions.

Further, assume that the shadow price of foreign exchange is determined by the supply and demand for foreign exchange and that the demand for foreign exchange is identical to the nominal value (in foreign currency) of the demand for imports, that is

(5.2) $$FC^{d} = X_{mh}^{d} P_m^{w}$$

where FC^{d} denotes the demand for foreign currency.

Now, assume that the supply of foreign exchange is a sum of three components: an exogenous supply of foreign exchange consisting largely of foreign aid and remittances by Yugoslav workers abroad (FW); a policy determined factor that determines the amount of foreign exchange that will become available through the utilization of reserves and foreign borrowing (BOR); and export proceeds. Denote exports to hard currency areas by Eh, then

(5.3) $$FC^{s} = Eh\, P_e^{w} + FW + BOR.$$

While it could be argued that domestic demand conditions and P_f affected the policy factor BOR, we will assume, for simplicity that both BOR and FW were entirely exogenously determined.

The perennially overvalued dinar is borne out in the stilized facts of the behaviour of exports as well. Anecdotal evidence strongly suggests that for most Yugoslav firms hard-currency export prices at the going nominal exchange rate were lower than prices that could

be obtained for the same goods on the domestic market.[35] However, the analysis of hard currency export determination is complicated by the fact that there are two different possible explanations of the process of their determination, and we have no a priori criteria or empirical tests to help us select one.[36] The commonly held view supported by the survey in J. Prasnikar (1983) is that firms were motivated to export either because (a) they needed to pay for imports and the foreign exchange rationing system linked the amount of hard currency a firm could obtain to its hard currency earning; or because (b) there was excess capacity which made exporting attractive as long as export earnings stood above variable costs of production.[37] In either case, the benefit obtained for the exported good would have been the product of its foreign exchange denominated world price and the shadow price of foreign exchange, $P_e^w P_f$.

To the extent that exports were motivated by the need to earn foreign exchange, their determinant would have been $P_e^w P_f$, in addition to supply factors, such as the availability of production factors and technology, that we will denote by an umbrella term, SF. To the extent that exports were undertaken to employ excess capacity, their determinant would have been capacity utilization, Q, and the benefit $P_e^w P_f$. Then,

(5.4) $$Eh^s = e(P_e^w P_f, Q, SF)$$

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[35]Export prices were higher than domestic prices in some raw-material, mineral or energy production industries in which domestic prices were kept low through administrative controls. In those areas, exports were typically administratively restricted, especially in the earlier period of our analysis. The relatively small share of such industries in the overall economy does not justify the futher complication of our analysis.

[36]For a survey of econometric studies of Yugoslav foreign trade determination see J. Burkett (1983).

[37]Note that the effective no-layoffs constraint on Yugoslav enterprises, by rendering labor costs as fixed, meant that export prices could become extremely low. A firm would have been interested in selling as long as the price stood above the material costs of production and as long as trade barriers kept the low export price from having a feedback on the price the same commodity commanded on the domestic market.

Substitute (5.4) in (5.3), (5.1) in (5.2) and assume that P_f adjusts to equilibrate the supply and demand for foreign exchange, that is $FC^s = FC^d$. Then,

(5.5) $$e(P_f P_e^w, Q, SF)P_e^w + FW + BOR = m(P_f P_m^w, DD)P_m^w$$

Say that the foreign trade flows of each of the regions were determined as described in this model and that there was a single national market for foreign exchange in which P_f was determined through the equilibration of all regional supplies and demands of foreign exchange. Then, foreign trade with the hard-currency area needs to be incorporated in the generic model of Chapter Four as follows.

The introduction of the cost of foreign exchange wedge into import considerations does not affect the essence of the decision making process described in the derivation of demand in (4.2). Simply, the opportunity cost considered in the demand for domestic flows decision becomes $P_f P_{mj}^w$ rather than P_{mj} so (4.2) becomes modified into

(4.2a) $$X_{ij}^d = d(Y_j, B_{ij}, T_{ij}, P_{ij}, P_{jj}, P_f P_{mj}^w) \qquad \begin{matrix} i = 1,2 \\ j = 1,2 \end{matrix}$$

Clearly, P_f is not observed and we need to proxy the term $P_f P_{mj}^w$. In fact, the price P_{mj}, where $P_{mj} = P_{ie}^w \, NEX$ and NEX denotes the official nominal exchange rate, is the best available proxy of $P_f P_{mj}^w$. The official exchange rate in Yugoslav policy was correlated with P_f, and, according to model (5.5), P_{mj}^w itself was positively correlated with P_f.

Similarly, the essence of the decision-making process on the supply side does not become altered if the motive to export was the exporters' need to secure foreign exchange: the opportunity cost of supplying a unit of region i's output on the domestic market becomes $P_f P_{ie}^w$ rather than P_{ie}, and equation (4.1) would just need to be modified accordingly.

However, if the motive to export was the existence of excess capacity in the economy this puts us in an entirely different paradigm from the one underlying equation (4.1). The existence of persistent or systematic excess capacity can only be possible if suppliers do not operate on the PPF, there is no trade-off between supplying to one or another market, and there is an implicit assumption that markets are imperfectly competitive, probably operating in the region of IRS, which allows the supplier to essentially pick a point on the demand curve faced in each market and supply at the resulting price and quantity.

While the underlying market process differs substantially, the feasible econometric representation does not change much whether we are in the competitive world described in Chapter Four or in this imperfectly competitive world. The demand factors remain those listed in (4.2a). The supply function disappears, but the production factors—*Ki*, *Li* and *Ai*—continue to be of relevance to the quantity/output choice that suppliers will ultimately make. The cross-price effects in supply disappear, however, as the price commanded on one market has no direct effect on the supply decision in another market.[38] Therefore, regarding the model we wish to implement, the question becomes one of whether to replace P_{ia} with $P_f P_{ia}^w$ in (4.4b) or to drop both P_{ia} and P_{ir} altogether.

We are not aware of a body of empirical research, nor do we have an a priori basis, that could help us decide which was the overwhelming motive for exports in former Yugoslavia. Anecdotal evidence and Prašnikar's survey suggest that both motives were important. However, our preliminary estimations suggest that, regardless of the motive

[38]There is, of course, a cross-price effect in the supply decision through an effect of cross-market prices on the total quantity produced, which in turn affects marginal costs. However, such indirect effects are much too subtle for the level of aggregation in this study.

driving exports, export prices were in fact an endogenous variable, and their inclusion in the model would result in the estimation of simultaneous equation bias. We identified an unambiguous and highly significant negative association between export prices and export volumes, lending support to the view, widely held in the former Yugoslav public, whereby increases in exports came at the cost of reduced export prices.[39] This apparent endogeneity of export prices is probably explained by the fact that a large part of former Yugoslav exports consisted of manufactured goods, often of inferior quality; thus, product differentiation resulted in a downward sloping demand curve for them, despite Yugoslavia's small size.

The preliminary estimations suggest that export prices were primarily the consequence of the behaviour of Yugoslav exporters, and not the other way around. While instrumentation could help if foreign exchange earnings were the primary motive for exports, it would be unlikely to help if the motive was excess capacity. Preliminary attempts at instrumentation did not give encouraging results, not least because of the dearth of regionally differentiated variables that could be used as good instruments. In the event, we decide against the inclusion of hard-currency export prices altogether.

5.1.1.2 Trade With Clearing Areas

Trade with the area of clearing payments, principally the Soviet Union, Czechoslovakia, and East Germany, comprised approximately one half of former-Yugoslav trade although this proportion varied quite substantially in the case of the individual regions.

[39]The detailed estimation results are reported in Appendix IV.

Clearing trade countries were "soft markets" for former Yugoslavia, while former Yugoslavia was a relatively "hard market" for them. A part of imports from the clearing area consisted of raw materials not available domestically and petroleum. Another important component were less desirable substitutes for goods from the hard-currency area. Exports to clearing areas consisted largely of manufactured goods made on western licences. Such goods were scarce in the Eastern bloc countries and, when inferior in quality, unsaleable in the West. Throughout most of the life of second Yugoslavia the level of trade with Eastern Europe was politically controlled to avoid excessive dependence on that market.

The institutional set-up of clearing trade did not allow for a regular market clearing process. Prices were administratively set and while their nominal levels followed World prices relatively closely, the actual relative prices were given by the effective terms of trade obtained in the administrative trade agreements. There are strong reasons, therefore, to question the extent to which prices rather than administrative and political factors drove the trading process. To the extent that they did, this will be captured by the effect of the foreign trade price variables we have used for trade with the hard-currency area.[40] However, to the extent that trade with the clearing area was administratively determined, we would have to consider the export and import levels as exogenously given, and equation (4.4b) would have to incorporate these exogenously determined trade volumes in addition to the other variables. We explore this issue in the remainder of this section.

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[40]Foreign trade prices are not differentiated by hard-currency and clearing area. As statistics recorded the nominal prices at which goods were traded, the price variables largely reflect World prices and are likely an acceptable measure of the prices obtained/paid in trade with the hard-currency area. This is less so for the prices obtained/paid on the clearing area. For more on the foreign trade price variables, see Appendix III.

At the going prices, demand for former Yugoslav goods in the clearing areas appears to have been unbound—clearing areas were ready to absorb as much as Yugoslav firms were willing to sell. In years of high domestic demand, there tended to be a trade deficit with the clearing area, and in times of slack, a trade surplus. Over the long run exports were limited by import needs, actual or those that would be considered politically permissible. Therefore, clearing exports appear to have been overwhelmingly determined by Yugoslav-specific demand and supply conditions.[41] As such, the attempt to include them in the model would mostly lead to the estimation of simultaneous equation bias. So, we do not include them in the estimation.

It is more difficult to gauge on an *a priori* basis whether clearing imports were determined primarily by exogenous factors, or were endogenously determined by developments in the other markets. For example, a sharp increase in imports from the clearing area after the second oil shock in the early 1980s was as much a result of the new urgency of the need to find substitutes for goods that were earlier paid with scarce foreign currency, as it was a result of the fact that, with Tito's death, there was no more an authority powerful enough to limit Yugoslavia's dependence on Eastern markets.

In earlier periods, political controls may have kept imports below the notional demand for them. As political restrictions on imports were lifted, the situation appears to have reversed: imports expanded and may have reached the boundary in the availability of

[41] In 1986, the country's accumulated trade surplus with the clearing area reached US$2 billion. Over the several years of austerity that had preceded 1986, Yugoslav enterprises had been able to place more exports in clearing areas than they could find reciprocal imports. At that point, the regulations were changed. Payment to exporters would be made to the extent that reciprocal imports had been secured and on a first-come-first-serve basis. As a result, exports to clearing areas declined sharply in 1987.

goods of interest. A decline in effective prices had possibly no effect on the effective demand for the goods. Rather, changes in these imports may have reflected shifts in the boundary of demand for these goods determined by other factors, such as the availability of foreign exchange, or the pressure of demand on the domestic market.

We therefore opt for implementing the final model with and without the volume of clearing imports as an exogenously given variable and analyzing their coefficients and interaction with the remaining variables in the model to decide if they belong there. We expect that if they were exogenously determined, their level would have a negative effect on domestic trade, and their coefficient would not interact with that on import prices, as they were each determined by different factors. Otherwise, clearing imports will be excluded from the final formulation of the regression. The stylized facts of foreign trade in former-Yugoslavia suggests the following modification of model (4.4b) thus far,

$$X_{ij,t} = g^{c}(K_{i,t}, L_{i,t}, A_{i,t}, Y_{j,t}, B_{ij,t}, P_{mj,t}, Mc_{j,t}, P_{kj,t}, P_{is,t}, T_{ij,t}, \Pi_t, Z) \tag{5.6}$$

$i = 1, 2$
$j = 1, 2$
$k = 1, 2 \qquad k \neq i$
$s = 1, 2 \qquad s \neq j$
$t = 1, \ldots \tau$
if i = j, then $Z = 0$
if i ≠ j, then $Z = 1$

where $Mc_{j,t}$ denotes region j's imports from the clearing areas and τ is the number of periods in which the flows are observed.

5.1.2 Unobserved Variables

Several of the variables in (5.6) are not observed: technology A_i and preferences B_{ij} are umbrella terms for a wide variety of factors that are difficult to observe and for which we have no proxies. The industrial similarity indices that we will use in Chapter Six to proxy for B_{ij} cannot be applied when intra-regional flows are involved as there is no measure for the concept of "industrial complementarity with oneself." In the case of the former Yugoslav regions, there are also no observations for transportation costs, T_{ij}, nor for prices P_{kj}, P_{ks}, P_{ir} and P_{jj}.

The unobserved factors B_{ij}, A_i, and T_{ij} are key to the important differences in the average size of the individual flows. Since they cannot be measured, it is best to eliminate the flow and factor averages over time. That is, in a panel data set-up, we should sweep out individual-specific effects with a random-effects or fixed-effects specification. As the three unobserved factors change slowly through time, sweeping individual-specific effects will eliminate most of their effect on the observed flows. Note, however, that in our case the individual is the flow between each pair of regions, so in our notation the individual is not denoted with the subscript i as is usual in panel data sets, but with the full subscript ij. To avoid confusion, we will call the individual-specific effects, "flow-specific" effects. We choose a fixed-effects specification because the focus of this study are the characteristics of the units observed, rather than these characteristic as representative of a wider population of units (C. Hsiao, 1986, pp. 41–43).

The removal of individual specific effects has the disadvantage of also removing the time-invariant component of Π_r. A constant cost premium on inter-regional trade cannot be identified—only its change over time, if significant, can.

Regarding the cross-price terms, we consider the use of regional consumer price indices or deflators as proxies. The problem with using these as proxies is that a region i's deflator or CPI is just as much a proxy of the price P_{ij} as it is of the price P_{ii}. Similarly, when there are only two regions, region j's CPI is just as much the proxy of the price P_{jj} as it is of the inverse of the price P_{ij} (recall that prices have to be considered in relative terms). If we were to consider more than two regions, then the latter would not be true.

As discussed below, in this Chapter we implement the model in a two-region framework; that is, for each region we analyze its decision to purchase/sell from/to itself versus from/to the ROC. In this case the two regional price indices proxying the cross-price terms would be too close to proxying the price of the analyzed flow, which was solved away in (4.4b). For example, in the determination of X_{12} we would use the deflator of region 1 to proxy for P_{11} and the deflator of region 2 to proxy for P_{22}. But the deflators of region 1 and 2 together are also a proxy of the price P_{12} (in terms of the commodity 2) and it would be impossible to interpret the coefficients obtained in such a regression. Therefore, we drop the two cross-price effects from the estimation.

5.1.3 Enterprise Divisionalization

In addition to the described economic variables, a variable is needed in the model to control for the effect on observed flows of the enterprise divisionalization occurring

throughout the period of analysis. The unit observed by the survey that produced our trade flows was the lowest economic organizational form available at the time of each observation. As enterprises were divided into BOALs, flows previously internal to the unit of observation (the enterprise), and therefore unrecorded, became external to the new units of observation (BOALs) and recorded by the survey. In 1983 an about-face on divisionalization took place, and many BOALs were merged again into compact work organizations. Therefore, between 1970 and 1983, the organizational changes would have inflated the value of recorded sales, while in the later 1980s the flows would have been deflated, but to a lesser extent. Since the proportion of enterprises owning subsidiaries or plants outside the mother region was negligible, the organizational changes would have had a large effect on intra-regional trade, while inter-regional trade would have been barely affected, if at all.

To control for this organizational effect, we construct a variable that takes the value 0 if the flow is inter-regional and takes the value of the ratio of aggregate material costs of production to regional GMP if the flow is intra-regional. Given a certain production technology and prices, the material costs of production at a certain level of value added are given by market structure. Consider, for example, the extreme case of all output in an economy being produced by one integrated firm. In that case, the entire output of the economy would equal its value added and there would be zero material costs of production. Alternatively, production in an otherwise identical economy may be decentralized onto several production units that sell their output to one another. In that case, the value added of one producer becomes the material cost of production of another, and so on. For a given production technology, price structure and level of value added, the aggregate material costs

of production will entirely depend on the number of production units selling in the market. Hence, assuming that technology did not change substantially, and that changes in relative prices did not systematically affect the cost of material inputs relative to other prices, the ratio of material costs of production to GMP largely measures enterprise divisionalization in the economy.[42]

5.1.4 The Final Set of Variables

In conclusion, considering the data limitations and determination of foreign trade in former Yugoslavia described above, and assuming for simplicity that there are only two regions, model (5.6) becomes modified into:

$$X_{ij,t} = g^{i}(K_{i,t}, L_{i,t}, Y_{j,t}, P_{mj,t}, MC_{i,t}, CTL_{i,t}(1 - Z), \Pi_t, Z, \lambda_{ij}) \quad (5.7)$$

$i = 1, 2$
$j = 1, 2$
$t = 1, \ldots \tau$
if i $= j$, then $Z = 0$
if i $\neq j$, then $Z = 1$

where $CTL_{i,t}$ stands for "control," the variable that controls for the effect of enterprise divisionalization in the region selling to itself, and λ_{ij} stands for the unobserved flow-specific, time-invariant factors. P_{mj} is the price of foreign imports, and it should be understood to stand as a proxy of the actual opportunity cost of imported goods, $P^{w}_{im}\,Pf$.

[42]For more about the correlation of material costs of production and enterprise divisionalization, see Appendix III.

5.1.5 Flow Aggregation

In principle we could either implement model (5.7) on the disaggregated bilateral flows among the eight former Yugoslav regions (64 flows in each time period), or aggregate each region's sales/purchases, to/from regions other than itself into one sales/purchases flow. In the latter case, we would observe, for each region, one intra-regional sales/purchase flow, one to-*ROC* (rest of country) sales flow and one from-*ROC* purchases flow, a total of 24 flows in each time period, giving a total of 192 observations in the entire set.

While the disaggregated flows give nearly four times as many observations on the dependent variable, disaggregation would contribute little to estimation power because there would be no increase in the range of values taken by the *RHS* variables. The available *RHS* variables are all region-specific, not flow specific, so when the flows are disaggregated, the *RHS*-variable values are only repeated more times. The only difference is the presence in the aggregated specification of *ROC* values for each variable, derived from regional data, as an aggregate of seven regional observations.

Also to be considered is the effect of aggregation on variance in the error term. While some systematic components of the error term might be enhanced, it is fair to assume that the unsystematic components—errors linked to industry specific, or enterprise specific shocks—would decline as they would offset each other in aggregation. The intra-regional flows are much larger than the inter-regional flows so aggregation of the inter-regional flows makes the size of the inter-regional flow and the composition of its error term more similar to that of the intra-regional flows. On the down side, aggregation would introduce a correlation between the errors in the flows where region *i* is one of the trading regions and

the errors in the flows where region i is an *ROC* component. Taking into account that every *ROC* is composed of seven regions, we can assume that this latter source of correlation would be negligible.

In summary, the considerations in favor of conducting the estimations on the aggregate flows appear stronger, and this is the option adopted. Denote the aggregate of seven of the regions excluding region i by r_i. Henceforth, X_{ij} might denote three types of flows: X_{ii}, intra-regional trade of region i; $X_{ir(i)}$, sales to *ROC* by region i; and $X_{r(i)i}$, purchases from *ROC* by region i where parenthesis around i in the subscript to r denotes that i is a subscript of r itself. The formulation of model (5.7) becomes

$$X_{ij,t} = g^z(K_{i,t}, L_{i,t}, Y_{j,t}, P_{mj,t}, MC_{i,t}, CTL_{i,t}(1-Z), \Pi_t Z, \lambda_{ij}) \tag{5.8}$$

$i = 1, 2, \ldots 8, r_1, r_2, \ldots r_8$
$j = 1, 2, \ldots 8, r_1, r_2, \ldots r_8$
$t = 1, \ldots . \tau,$
if $i = j$ then $Z = 0$, and $i, j \neq r_i$
if $i \neq j$ then $Z = 1$, and when $i = s, j = r_s$
$i = r_s, j = s.$

In further text, the subscript i of r will be suppressed when it can be understood.

5.1.6 Proxying Disposable Income

We do not observe regional disposable income, Y_j. Instead, we use an estimate of regional absorption as a proxy for disposable income. Denote the total absorption of region j with AB_j. Then,

$$AB_j = C_j + I_j + G_j = GDP_j + X_{mj} + X_{rj} - X_{je} - X_{jr} \tag{5.9}$$

where C_j is consumption, I_j is investment, G_j is government consumption, X_{mj} are imports, X_{rj} are purchases from the *ROC*, X_{je} are exports, and X_{jr} are sales to the *ROC*, all for region j. We estimate AB_j by adding to regional GMPs the difference between the sum of purchases from *ROC* and foreign imports and the sum of total sales to the *ROC* and exports, based on the interregional trade data and foreign trade data used in the estimation itself.[43]

Disposable income is by definition,

(5.10) $$Y_j = GDP_j + FS_j + T_j$$

where FS_j is net factor service flows into/from region j (including interest on borrowing), and T_j are net transfers into/from region j.

To see how disposable income differs from absorption, substitute the following identity derived from the balance of payments, where BOR_j is region j's net borrowing and ΔR_j is region j's utilization of the country's foreign exchange reserves, into (5.9) and subtract from (5.10).

(5.11) $$X_{mj} + X_{rj} - X_{je} - X_{jr} = FS_j + T_j + BOR_j + \Delta R_j ,$$

This gives

(5.12) $$AB_j - Y_j = BOR_j + \Delta R_j$$

That is, regional absorption differs from disposable income by the amount of the region's net borrowing, both within the country and abroad, and by its share in the utilization of the country's foreign reserves.

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[43]Note that the used measure of regional production (*GMP*) differs from *GDP*. This, as well as other aspects of the Marxist definition of the variables measured in former-Yugoslav statistics, is discussed in Appendix III.

The major concern caused by the method with which we obtained the disposable income proxy is that, by virtue of it being derived from the data set on inter-regional flows that are also the dependent variable in the estimation, it is endogenous to the system and the estimated coefficients on income will suffer from simultaneous equation bias. The analysis of the bias, and the application of instrumental variables estimation to control for this problem, is discussed later in the chapter, after the econometric structure of the model has been presented.

5.2 Econometric Specification and the General Hypothesis

5.2.1 Specification

We specify model (5.8) in log-linear form. We remove flow-specific effects by taking, for each flow $X_{ij,t}$ and regressor variable, the deviations from the averages of the logs over time. This sweeps out from the regression the time invariant factor λ_{ij}. Allowing the indicator Z in (5.8) to take the values 0 and 1, that is, that the determinants of intra- and inter-regional flows differ, gives us two regression sub-systems: sub-system 0 (referring to intra-regional flows), and sub-system 1 (referring to inter-regional flows).

Denote with lowercase letters the mean deviations of the logarithms of the variables denoted in uppercase letters. To repeat for the reader's convenience: $k_{i,t}$ is seller region capital, $l_{i,t}$ is seller-region labor, $y_{j,t}$ is buyer-region disposable income (proxied by estimated regional absorption), $p_{mj,t}$ is the price of buyer-region hard-currency imports (converted at the official exchange rate) , $mc_{j,t}$ are the clearing area imports of the buyer-region, $cntl_{i,t}$ is the control variable for the effect of enterprise divisionalization and *trd* is a trend. Then,

Sub-system 0:

(5.13a)
$$x_{it,t} = \beta_k^0 k_{i,t} + \beta_l^0 l_{i,t} + \beta_y^0 y_{i,t} + \beta_p^0 p_{mi,t} + \beta_{mc}^0 mc_{i,t} + \gamma ctl_{i,t} + \pi^0 trd + u_{it,t} \qquad i = 1, \ldots 8, \; t = 1, \ldots 8$$

and

Sub-system 1:

(5.13b)
$$x_{ij,t} = \beta_k^1 k_{i,t} + \beta_l^1 l_{i,t} + \beta_y^1 y_{j,t} + \beta_p^1 p_{mj,t} + \beta_{mc}^1 mc_{j,t} + \pi^1 trd + u_{ij,t}$$
$$i = 1, \ldots 8, r_1, r_2, \ldots r_8,$$
$$j = 1, \ldots 8, r_1, r_2, \ldots r_8,$$
$$\text{when } i = s, \; j = r_s$$
$$\text{when } i = r_s, \; j = s$$

where the β^zs, γ and π^z are the coefficients measuring the effect of the respective variables on regional trade flows and $u_{ij,t}$ is the regression error.

Note that the specification of the cost premium differs somewhat in (5.13) from model (5.8). Model (5.8) allowed for Π_t to take a different value in each time period. However, as with the fixed-effects specification we swept out any time-invariant component of the cost-premium on inter-regional flows, we are left with the options to either use time-specific dummies to estimate a deviation of Π_t from the average over time, or to use a trend. Preliminary estimations using dummy variables showed that the value of the dummies' coefficients became increasingly negative over time and that replacing the dummies with a trend would give sharper results. Also (5.8) assumed that $\Pi_t^0 = 0$. Model (5.13) however, allows for $\pi^0 \neq 0$ to capture any unidentified changes in the conditions of domestic trade affecting both inter- and intra-regional flows indiscriminately.

The trend in specification (5.13) allows us to identify a steadily increasing or declining cost premium. The presence of an increasing cost premium would be expressed as $\pi^0 - \pi^1 > 0$ while a steadily declining one would be expressed as $\pi^0 - \pi^1 < 0$.

5.2.2 Expected Results

Whether homogeneity in the determination of the flows holds or not, we expect for both sub-systems that the coefficients on capital, labor, disposable income, and the control variable are positive, that is $\beta_k^z, \beta_l^z, \beta_y^z, \gamma > 0$. The sign of the coefficient on import prices in theory could go either way—if the demand substitution effect is dominant, it will be positive, and if the income effect is dominant, it will be negative. However, with the exception of Slovenia in the 1970s, imports comprised at most 26 percent of the absorption of any region at any point in time, and usually less. Therefore, we expect to see a dominant substitution effect, that is, $\beta_p^z > 0$, and that the coefficient on clearing imports β_{mc}^z is negative. The sign of the trend coefficients could, in principle, go either way. If there was a bias for intra-regional trade, we would expect that the differences $\pi^1 - \pi^0$ and $\beta^0_s - \beta^1_s$ (where s stands for any of the factors k_i, l_i, y_i, pm_j and mc_j) would either equal zero, or conform to a specific pattern discussed below, of course, they would not equal zero in at least one case.

In the presence of a bias, an **increase** in the supply factors, disposable income and import prices would have to lead to a greater positive response in the case of intra- than inter-regional trade. An increase in clearing imports would have to lead to a smaller (in absolute terms) negative response in intra- than inter-regional flows. However, there is an asymmetry in the expected coefficient differentials in case any of the factors **declines**. For example, if

the availability of a supply factor in the seller region or disposable income in the buyer-region declined, we would expect that the consequent decline would be **smaller** in the case of intra-regional than inter-regional flows.

Denote the effect of an increase in factor s with β_s^{z+}, and denote the effect when it declines, with β_s^{z-}. Then, for the four factors whose coefficient is expected to be positive, we would expect to see $\beta_s^{0+} > \beta_s^{1+} > 0$ and $\beta_s^{1-} > \beta_s^{0-} > 0$. And similarly for mc_j, whose effect should be negative, we expect that $0 > \beta_{mc}^{0+} > \beta_{mc}^{1+}$ and $0 > \beta_{mc}^{1-} > \beta_{mc}^{0-}$.

In principle, this would have to considerably complicate our estimation strategy. We need to separate the instances when the relevant variables increase from those when they decline and considering that only eight observations (seven time intervals) are observed, we probably would not have sufficient degrees of freedom to conduct our estimation. Fortuitously, the production factors (k_i and l_i) do not exhibit a decline in any period for any region so the estimated coefficient on capital and labor can unambiguously be considered estimates of β_k^{z+} and β_l^{z+}, respectively. In the presence of an intra-regional trade bias we expect to find $b_s^0 \geq b_s^1 > 0$, where b_s stands for the estimated coefficients b_k and b_l of β_k and β_l.

Disposable income exhibits a decline for all regions only once, and in a few isolated instances it declines for individual regions in other periods. All the declines are relatively small. Therefore, we expect that β_y^{z+} will dominate β_y^{z-} and that the estimate $b_y^0 > b_y^1 > 0$ would be consistent with an intra-regional trade bias.

Import prices declined for all regions in three out of the seven time intervals, and clearing area imports declined with somewhat less frequency but often enough to preclude

any definitive expectations of the relative coefficient size. We will therefore not consider any estimated differential effects of these two factors on inter- and intra-regional flows as evidence of segmentation among the regions.

5.2.3 Estimation Strategy

Our null hypothesis is that the coefficients in system 0 and system 1 are homogeneous, that is, the vectors of coefficients in the two sub-systems are equal: $\beta^0 = \beta^1$, where $\beta^z = [\beta_k^z, \beta_l^z, \beta_y^z, \beta_p^z, \beta_{mc}^z]$, and $\pi^0 = \pi^1$. To test this we join the two systems in a *SUR* and then test the homogeneity of each one or more coefficients by testing the restriction that $\beta_s^1 = \beta_s^0$. Denote with x_{ii} the (64x1) vector of observations of intra-regional flows (eight regions selling to themselves in eight time periods); denote with x_{ir} the (64x1) vector of regional sales to the *ROC* (eight regions selling to the *ROC* in eight time periods); and denote with x_{ri} the (64x1) vector of regional purchases from the *ROC* (eight regions purchasing from the *ROC* in eight time periods).

Denote, further, with H^0 the (64x7) matrix of regressors given by (5.13a), denote with H^1 the (128x6) matrix of regressors given by (5.13b), and denote with U_{ii}, U_{ir}, and U_{ri} the (64x1) vectors of error terms for each type of flow. The system we estimate can then be represented as

$$(5.14)\qquad \begin{bmatrix} x_{ii} \\ x_{ir} \\ x_{rj} \end{bmatrix} = \begin{bmatrix} H^0 & O \\ O & H^1 \end{bmatrix} \begin{bmatrix} \beta_k^0 \\ \beta_l^0 \\ \beta_y^0 \\ \beta_p^0 \\ \beta_{mc}^0 \\ \gamma^0 \\ \pi^0 \\ \beta_k^1 \\ \beta_l^1 \\ \beta_y^1 \\ \beta_p^1 \\ \beta_{mc}^1 \\ \pi^1 \end{bmatrix} + \begin{bmatrix} u_{ii} \\ u_{ir} \\ u_{rj} \end{bmatrix}$$

Typically, a SUR is run when we want to exploit some known relationship between the error terms of the sub-regressions. If the errors are i.i.d. an OLS on SUR is equivalent to running two independent OLS regressions. In our case the SUR is a device to allow us to test for the homogeneity of the β coefficients and π across two sets of observations. However, regardless of whether our null hypothesis of homogeneity of slope coefficients is true, we cannot neglect the possibility that there is heteroskedasticity and/or correlation among the error terms of the two sub-regressions.

In particular, we are concerned about heteroskedasticity, or error correlation across inter- and intra-regional flows as this could affect our conclusion regarding the intra-regional bias.

We discuss these possibilities further in the next section, together with other preliminary estimations conducted to prepare the definitive testing of system (5.14). The conclusion of the preliminary regressions is that, indeed, the error across the two sub-systems in (5.14) can be considered i.i.d. We therefore apply a simple OLS as well as an IV estimation, instrumenting the variable y_j.

5.2.4 Endogeneity of the Y_j Proxy

Assume for the moment that the original variable X_{ij} is a linear, not log-linear, function of its determinants. This will simplify the analysis of the error term of the regression, and how AB_j, the endogeneous proxy for Y_j, may interact with it, without loss of generality of the conclusions. Decompose a flow at a point in time as $X_{ij} = g(\boldsymbol{h}_{ij}) + U_{ij}$ where $\boldsymbol{h}_{ij}$ is the vector of arguments of the function (5.8) time subscripts have been supressed, and U_{ij} is the error term. Then, replacing X_{ij} and X_{jr} in equation (5.9) with this representation we obtain

$$AB_j = GDP_j + X_{mj} + g(\boldsymbol{h}_{ij}) + U_{ij} - X_{je} - g(\boldsymbol{h}_{jr}) - U_{jr} \tag{5.15}$$

Clearly, AB_j is positively correlated with the error term U_{ij} and negatively with the term U_{jr}. Once the variables have been de-meaned, the error U_{ij} consists of the effects of the two omitted cross price terms, a measurement error for the flow, and a random shock that we expect is affected largely by shocks to tastes and technology.

Table 5.1 in column 2 presents the composition of the error term of each of the three types of flows in the main regression and in column 3 it presents the components of the income proxy AB_j. The symbol for the flow X_{ij} in the first column of the table is marked with an asterix, to underscore the fact that we do not observe the true flow, but a statistical variable that incorporates a considerable measurement error.[44] The error in the measurement of X_{ij} is denoted with MER_{ij}. Other new notation is as noted at the foot of the table.

[44]In all other sections of this chapters we suppress the asterisk.

Table 5.1. Intra-Regional Trade Bias, 1970–87: Endogeneity of Income Proxy

Observed Flow 1	U_{ij} Error Components 2	Arguments of Y_j Proxy 3	Sign of Bias 4
X_{ij}^{*}	$U_{ij} = \beta_1 P_{jr} + \beta_2 P_{rj} + MER_{ij} + \xi_{ij}$	$AB_j = q_j + (\beta_1 - \beta_2)(P_{rr} - P_{ij}) + MER_{rj} - MER_{jr} + \xi_{rj} - \xi_{jr}$	Negative or None
X_{jr}^{*}	$U_{jr} = \beta_1 P_{ij} + \beta_2 P_{rr} + MER_{jr} + \xi_{jr}$	$AB_r = q_r + (\beta_1 - \beta_2)(P_{ij} - P_{rr}) + MER_{jr} - MER_{rj} + \xi_{jr} - \xi_{rj}$	Positive
X_{rj}^{*}	$U_{rj} = \beta_1 P_{rr} + \beta_2 P_{ij} + MER_{rj} + \xi_{rj}$	$AB_j = q_j + (\beta_1 - \beta_2)(P_{rr} - P_{ij}) + MER_{rj} - MER_{jr} + \xi_{rj} - \xi_{jr}$	Positive

New notation: * denotes a statistically observed, not actual flow; MER_{ij}, measurement error; $q_j = GDP_j + X_{mj} - X_{ie} + g(h_{rj}) - g(h_{jr})$; ξ_{ij} – random error; β_1, cross-price effect on flow supply; β_2, cross-price effect on flow demand.

The composition of the proxy shown in column 3 is derived by substituting the formulas for U_{jr} and U_{rj} as they appear in column 2 into equation (5.15) and regrouping the variables.

Four variables appear in both column 2 and column 3 in the case of the rows representing inter-regional flows: the two cross prices, the measurement error and the random error. That the random error and the measurement error are a source of positive coefficient bias in the case of inter-regional flows is obvious. However, the price terms are a source of positive bias as well. The cross-price effect on supply, β_1, is negative and the cross-price effect on demand β_2 is positive so $(\beta_1 - \beta_2) < 0$. This, in turn, renders the sign of each of the price terms inside the income proxy the same as the sign of the price term in the error of the regression.

In principle, there is no reason for there to be a bias in the income proxy coefficient in intra-regional flows. However, we believe that it is possible that such a bias exists because of the nature of the measurement error. The measurement error is determined by structural factors, such as the size of the private versus the socially owned sector of the economy and the structure of the region's commerce sector.[45] The flows actually observed in this study are sales flows. Purchase flows are derived from original sales flows whereby a region's purchases from the ROC are obtained as the sum of the sales of each region in the ROC to this region. As the measurement error is largely determined by structural characteristics of the selling region, and being that the selling region is the same for X_{jj} and X_{jr}, MER_{jj} and

[45]A detailed discussion of the coverage of the statistically observed flows can be found in Appendix III.

MER_{jr} are likely to be highly correlated. If this is true, we can expect that there will be a negative bias in the case of intra-regional flows.

Clearly, the described pattern of biases of the coefficient of the income proxy would affect the very conclusions that we are focusing on—a comparison of the effect of Y_j on inter- and intra-regional flows—by either estimating correctly or underestimating the effect of income in intra-regional flows, and overestimating the effect of income in inter-regional flows.

To correct for this, we need to instrument the variable Y_j. A good instrumental variable needs to be highly correlated with the regressor that is being instrumented for, but not be correlated with the error of the regression. Considering the limited availability of variables differentiated by region, and the high interdependence of variables in this macroeconomic system, finding good instruments is not a straightforward proposition.

Generalized demand shocks specific to region j, for example, those affecting the region's budget constraint, do not affect the relative price of P_{jj} to P_{rj}—so they can be assumed to affect ξ_{ij}. Shocks to other region's demand for good jj, will affect P_{jj} relative to P_{rj}, and so will supply shocks to the production of jj. Shocks that affect the demand preference for the good jj versus the good rj are captured by the random error term.

As mentioned earlier, the factors affecting the size of the measurement errors are structural. Their nature is such that we do not expect them to be correlated with macroeconomic variables correlated with income fluctuations. For example, the size of the private sector of a region could be linked to higher as well as lower average income levels, as there were high and low earning private sector activities. Moreover, it was a very stable,

slowly changing characteristic that would not have been affected by cyclical income fluctuations.

The random factor ξ_{ij} was probably most affected by shocks to the technology of the seller region, and shocks to the preference of the buyer region. The former would easily not be correlated with variables affecting *Yj*; however, the latter might have been correlated and we need to be cautious about this possibility.

We believe that the measurement error contributes significantly, possibly most significantly, to the bias of the income coefficient. A comparison of the magnitudes of regional AB_j, as estimated in this study, and GMP_j, shows that the relative size of the (positive or negative) trade balance of the regions could be very large—reaching as much as a positive 55 percent of the GMP for Vojvodina or a negative 120 percent for Montenegro. While inter-regional transfers in Yugoslavia were undoubtedly large, there is little doubt that these magnitudes are exagerated by measurement error.

The following variables are considered as candidates for instruments for the proxy for disposable income:

(a) *Number of nights spent by domestic and foreign tourists in a region (total tourist-nights)*. We expect that tourist-nights should contribute to the disposable income of a region, both as an income-generating activity, and because tourist spending contributes to *domestic* disposable income. This, in fact, is the concept of income we are trying to capture as we are not trying to explain the flows among the "nationals" of regions, but among the "residents," even if temporary. The variable is expected to be positively correlated with buyer-region disposable income.

There are channels through which tourist-nights could be correlated with the error of the regression. One is that tourist-nights spent in a region might affect its prices, P_{jt}. However, this happens through the channel of affecting the income determining the level of demand in the region so it represents no more than the inherent correlation between Y_j and P_{jt}. Another possibility is that exogenously caused changes in prices in a region could have a feedback by attracting more or less tourists to a region. This latter channel is unlikely to be of great significance considering that relative price variations between the Yugoslav regions were probably too subtle to affect the choice of tourist destinations among the regions. Finally, the fluctuations in the size of tourist visits to a region could conceivably affect the preferences of the region as to intra- relative to inter-regional purchases. While this effect was probably significant in the case of a region like Montenegro, whose tourist consumption was large relative to the total, in all other cases it is unlikely to have been too large. Moreover, there is no reason to believe that the preferences would be similarly affected in the case of all the regions. Most likely in some it led to more, and in the others to less inter-regional trade, depending on the structure of their production. Overall, we expect the correlation with the regression error to be negligible.

(b) *Regional government consumption*. Over the period of analysis this expenditure item in the national accounts was the slowest to adjust to the changed macroeconomic environment in the 1980s. Since the regional distribution of such spending was heavily affected by politically negotiated transfers of income from more to less developed regions, this variable should be a good instrument for transfers among regions, and therefore buyer-region disposable income.

As in the case of tourist-nights, by affecting the structure of consumption this variable could conceivably have an effect on a region's preferences, but there is no reason to believe that this correlation would work in the same way in most regions. Therefore, we believe this factor is not significantly correlated with the error of the regression.

(c) *Regional investment*. On the one hand, prices in former Yugoslavia were very inelastic and the economy can be pictured as a conjunction of markets in disequilibrium, some of which with excess capacity that could never be employed by the domestic market, and some unable to satisfy excess demand. On the other hand, despite the decentralization of investment decision-making, investment can be considered to have been an exogenously determined policy variable. Numerous studies attest to the fact that investment demand at the microeconomic level was unlimited—both because of the very low or often negative real cost of capital, and because of the soft-budget constraint which imposed very little accountability on those responsible for investment decisions. The unbound micro-economic agents' hunger for investment was controlled through policy-makers' rationing, both ex-ante, through plan negotiation and ex-post mostly with direct regulation. The major instrument of rationing throughout the plan period was regulation, often of a temporary nature, and political pressure at all levels of government. Furthermore, it is fair to assume that the variation in regional distribution of investment was determined largely by regional political bargaining and exogenous factors such as the destination of major foreign aid flows.[46]

Investment can thus be expected to have been correlated with disposable income through two channels: first, investment levels were affected by factors that were likely to

[46]See J. Burkett (1983) for a description of the role of regulation in the conduct of macroeconomic policy.

affect disposable income as well (such as the availability of foreign transfers); second, through a Keynesian multiplier mechanism, investment had a powerful effect on the extent to which product markets, especially those producing investment goods that were unlikely to find too many foreign buyers, would approach potential output levels.

As in the case of tourist-nights, we can expect that investment level in a region affected the region's own prices, but this happened primarily through the effect it had on its disposable income. Investment is also likely to have affected preferences, but this effect would be of opposite signs in regions that were primarily producers of investment goods and those that were not, altogether cancelling out.

(d) *Employment in the buyer region.* As the employed factors of a region determine its potential production level, so they are an important determinant of the magnitude of income that can be earned through production. We expect both K_j and L_j to be correlated with Y_j. However, while K_j, as is normal, could be expected to have a lowering effect on region j's prices, we do not expect the same of L_j. Recall that the market structure in Yugoslavia was oligopolistic, and that there was no labour market as such. Employment grew with the opening of new capacities, and this is the reason why we consider it a supply factor, but it also grew as a politically imposed process. In "good times," existing plants and enterprises were expected to "distribute" their growing income among the communities' residents by increasing employment. Once on the payroll, people were not layed off, and higher employment within an enterprise tended to lead to lower downward flexibility of prices.

Clearly, higher employment also affected region j's prices through the demand side, but this happened through the effect it had on the region's income. We don't expect that

employment in region j would have had a particular effect on the preferences of the region for inter- versus intra-regional flows.

5.3 Preliminary Estimations

5.3.1 Correlation Matrix of All Variables

Table 5.2 presents the matrix of correlations among all the variables (logarithms in mean-deviation form) involved in the present estimation, including the dependent variable x_{ij}, the discarded export price regressor p_{ie}, and the instruments. It is interesting to note that there is not one single negative correlation and that there are several above 0.95. All variables, with the exception of the control for enterprise divisionalization (*ctl*) and investment, exhibit a correlation with the trend higher than 0.74. The trend is particularly strong for capital, labor and tourist nights (k_i, k_j, l_i, l_j, and tun_j) and, not surprisingly, the correlation among those variables is very high as well: 0.98 for capital and labor, and over 0.95 for both capital and labor with tourist nights. Note, that the correlation between import and export prices is also high, 0.95. Finally, note that the dependent variable, x_{ij}, has a rather high correlation with the trend 0.77, and that its correlation with the other variables with strong trends is generally higher than 0.80. We should, therefore keep a watchful eye for multicollinearity among the variables of this system.

5.3.2 The Instrument Set

While the method used to estimate system (5.14) is IV estimation, to test for the appropriateness of the instruments for regional disposable income y_j, we estimate what would

Table 5.2. Intra-Regional Trade Bias, 1970–1987: Matrix of Variable Correlations (Mean-deviations of logarithm of original variables)

	ctl	k_i	l_i	y_j	p_{mj}	tun_j	inv_j	gcn_j	trd	l_j	k_j	x_{ij}	p_{ei}	mc_j
Control, *cntl*	1.00	0.31	0.29	0.31	0.24	0.33	0.36	0.31	0.23	0.29	0.31	0.54	0.22	0.43
Seller-capital, k_i	0.31	1.00	0.98	0.88	0.74	0.96	0.41	0.84	0.97	0.97	0.99	0.84	0.64	0.69
Seller-labor, l_i	0.29	0.98	1.00	0.84	0.72	0.95	0.34	0.80	0.97	0.97	0.97	0.82	0.61	0.65
Buyer-income, y_j	0.31	0.88	0.84	1.00	0.65	0.84	0.63	0.82	0.82	0.82	0.87	0.87	0.54	0.74
Import-prices, p_{mj}	0.24	0.74	0.72	0.65	1.00	0.66	0.12	0.37	0.74	0.71	0.74	0.66	0.94	0.41
Tourist-nights, tun_j	0.33	0.96	0.95	0.84	0.66	1.00	0.36	0.81	0.94	0.96	0.96	0.80	0.55	0.70
Investment inv_j	0.36	0.41	0.34	0.63	0.12	0.36	1.00	0.64	0.25	0.33	0.40	0.59	0.08	0.66
Government consumption, gcn_j	0.31	0.84	0.80	0.82	0.37	0.81	0.64	1.00	0.78	0.78	0.84	0.75	0.26	0.73
Trend, *trd*	0.23	0.97	0.97	0.82	0.74	0.94	0.25	0.78	1.00	0.97	0.97	0.76	0.64	0.60
Buyer-labor, l_j	0.29	0.97	0.97	0.82	0.71	0.96	0.33	0.78	0.97	1.00	0.98	0.80	0.62	0.65
Buyer-capital, k_j	0.31	0.99	0.97	0.87	0.74	0.96	0.40	0.84	0.97	0.98	1.00	0.84	0.65	0.70
Trade flows, x_{ij}	0.54	0.84	0.82	0.87	0.66	0.80	0.59	0.75	0.76	0.80	0.84	1.00	0.57	0.75
Export-prices, p_{ei}	0.22	0.64	0.61	0.54	0.94	0.55	0.08	0.26	0.64	0.62	0.65	0.57	1.00	0.36
Clearing imports, mc_j	0.43	0.69	0.65	0.74	0.41	0.70	0.66	0.73	0.60	0.65	0.70	0.75	0.36	1.00

[1]All variables other than the trend are mean deviations of logarithms of original variable.

have been the first stage of a 2-stage LS. We run an OLS regression of y_j, on a set of variables consisting of the proposed instrument set and of all the RHS variables of the system (5.14) other than y_j. The regression form corresponds exactly to that of the main regression; that is, it is a SUR where the dependent variable takes the values that y_j takes as a RHS variable in the main regression, while the regressors are identical to those of the main regression with the exception that y_j is replaced by the five instruments discussed in section 5.2.4 for region j: investment, inv_j, government consumption, gcn_j, total tourist-nights, tun_j, and labor l_j. Since seller- and buyer-region labor in the case of intra-regional flows is the same variable, l_j is not included as an instrument in the sub-system 0.

Preliminary estimations show that government consumption is not significant (and has the wrong sign) in both sub-systems. The other instruments are highly significant and their coefficient estimates change little whether gcn_j is included or not, so we discard gcn_j. The results of the final estimated regression are given in Table 5.3.

In the final estimation, all instruments are significant at the 1 percent level and their signs are, with the exception of l_j^1, positive as expected. The coefficient sign on l_i and l_j in both sub-regressions is negative. Apparently, income changes (recall that the model is in deviation form) are correlated not so much with increases in the individual factors, but with increases in the capital/labor ratio. Since this appears to be a meaningful relationship, and the exclusion of l_j^1 does result in a decline in the adjusted R^2 and in the significance of tun_j^1, yet it does not increase multicollinearity, we retain l_j^1 in the instrument set.

Clearly, the explanatory power of the regression is high, with an adjusted R^2 of 0.88. More importantly, when the instruments are excluded from the regression the adjusted R^2

Table 5.3. Intra-Regional Trade Bias, 1970–1987: Regression of the Buyer-Region Income on Instruments and Other Equation 5.14 Variables

Variable	*ctl*	k_i^0	OLS Coefficients[1] l_i^0	pm_j^0	tun_j^0	inv_j^0	trd^0
(values as for intra-regional flows)	–0.406**	0.135	–0.598**	0.244**	0.391**	0.532**	0.027**
	(0.15)	(0.26)	(0.25)	(0.07)	(0.15)	(0.06)	(0.01)
Variable	l_j^1	k_i^1	l_i^1	pm_j^1	tun_j^1	inv_j^1	trd^1
(values as for inter-regional flows)	–0.610**	–0.115	–0.038	0.169**	0.297**	0.483**	0.039**
	(0.23)	(0.05)	(0.12)	(0.07)	(0.01)	(0.22)	(0.26)

[1]Standard errors in parentheses. ** denotes significance at 1 percent level; * denotes significance at 5 percent level.

declines to 0.77. The *F*-statistic of the joint significance of the five instruments is 28, that is, the instruments make a highly significant contribution to the improvement of the fit of the regression. Therefore, we expect this instrument set to perform well as to its explanatory power for income.

To the extent that the error term was dominated by the measurement error, we do not expect the instruments to be correlated with the error of the regression. However, to the extent that the errors were dominated by the cross-price effect of the purchasing region's price, their effectiveness would depend on the accuracy of our judgment about the likely channels through which the instruments might have had an effect on prices. The likelihood of their correlation with the random error proper is also not satisfactorily low.

To insure that we are not misled in our conclusions by the correlation between some of the instruments and the error of the regression, we conduct our IV estimations by dropping the instruments one variable (i.e., two regressors: the regressor for sub-system 0 and that for sub-system 1, except for l_j^1 which has only one regressor) at a time. The results with any sub-set of instrument variables are very similar to those obtained when they are all simultaneously included. This suggests one of two possibilities: either all the instruments are similarly correlated with the error of the regression, or none of them is. We find the latter conclusion the more plausible one.

5.3.3 Structure of Error Term

We are particularly concerned about possible sources of correlation between the error term in sub-system 0 with that in sub-system 1. Correlation in measurement error, could lead to positive correlation between U_{ii} and U_{ir}. Moreover, there are several sources of possible correlation between the ξ's.

Given a level of domestic purchases and foreign imports for a seller region, the sum of all its sales is constrained by its PPF. Similarly, given a level of domestic sales and foreign exports for a buyer region, its total purchases are linked by its budget constraint (even if it is possible to borrow). The tradeoff within a budget constraint or PPF could be a source of negative correlation among errors of flows involving the same region.

Conversely, shocks to the PPF or budget constraint, as well as changes in access to borrowing and inventories, would introduce a positive correlation between the error terms of sales/purchases by a region. Finally, region-specific errors in the measurement of the flows

may introduce a positive correlation between the errors, as described above. Any such correlation, however, could be described with the following relationship

(5.16a) $$u_{ir,t} = \rho_1 u_{ii,t} + \epsilon_{ij,t}$$

(5.16b) $$u_{rj,t} = \rho_2 u_{jj,t} + \epsilon_{ij,t}$$

To identify the structure of the error term, we first run OLS separately on sub-system 0 and on sub-system 1. The estimated slope coefficients are not reported here for they are the same as those obtained in the SUR described in the next section. The estimated variances of the error term, respectively, for intra- and inter-regional flows are 0.0730 and 0.0704. A Goldfeld-Quandt test cannot reject the hypothesis of homoscedasticity of the error term of the entire system, with an F-statistic of 1.079, (p-value of 0.366).

Next we test for correlation in the error terms by running two OLS regressions. First, we regress the estimated errors in regional sales to the rest of the country ($\hat{u}_{ir}$, the first 64 flows in sub-system 1) on the estimated errors in sub-system 0 ($\hat{u}_{ii}$). Next, we regress the estimated errors in regional purchases from the rest of the country ($\hat{u}_{rj}$, the latter 64 flows in sub-system 1) on the estimated intra-regional flow errors ($\hat{u}_{ii}$). The estimated relationships are

(5.17a) $$\hat{u}_{ir,t} = \underset{(0.14)}{0.216\ \hat{u}_{ii,t}} + \hat{\xi}_{ir,t} \qquad R^2 = 0.038$$

and

(5.17b) $$\hat{u}_{rr,t} = \underset{(0.11)}{-0.048\ \hat{u}_{ii,t}} + \hat{\xi}_{rr,t} \qquad R^2 = 0.003$$

where standard errors are in parentheses.

The estimated association between the error of sales within a region and that of sales to the rest of the country, $\hat{\rho}_1 = 0.216$, is positive, suggesting either that shocks to the production possibility frontier dominate the effect of flow-individual shocks or that the measurement error does. The coefficient is not significant at the 5 percent level, but it is at the 10 percent level. The estimated effect of the error of purchases within a region on that in purchases from the rest of the country, $\hat{\rho}_2 = -0.048$, is negative but this relationship is insignificant.

The question now is whether it is necessary to apply a specific econometric method, such as GLS or two-stage OLS, to the estimation of equation (5.14) in order to take care of the presence of ρ_1. Two considerations argue against it. First, the estimated correlation is not very high, nor highly significant. Second, the gains in efficiency obtained with a GLS relative to an OLS estimation decline with the increase in similarity of the regressors in the two sub-regressions of a SUR (Greene, 1997, p. 676). If the regressors of the two systems are identical, GLS gives the same results as OLS. Moreover, if the regressors in one of the SUR sub-systems are a sub-set of the other system, there is no gain in efficiency from a GIV for the smaller sub-system.

In our case, with the exception of the control variable, the regressors of the system 0 are all contained in either one (*ir*) or another (*rj*) partition of the system 1. Moreover, the correlation between the regional values and rest-of-the-country values of a variable are high in most cases. Therefore, the regressors in the two sub-systems are highly correlated. In sum,

the gain in efficiency from applying GLS is most probably not worth the cost in computation time.

5.4 Estimation of System (5.14) and Hypotheses Tests

5.4.1 System 5.14—Unrestricted Specification and Homogeneity of Coefficients

Table 5.4 presents the results of the OLS and IV estimation of system (5.14). Each estimation was done once including and once excluding buyer-region clearing imports, mc_j. The first two columns in the table give the OLS estimation results, and the latter two, give the IV estimation results where disposable income, y_j is instrumented in both sub-systems. The coefficient estimates for sub-system 0, intra-regional flows, are given in the top portion of the table, and those for sub-system 1, inter-regional flows, are given in the bottom.

In the two estimations that include mc_j (columns 1 and 3 of Table 5.4), the estimated coefficients on mc_j, are positive and significant only in sub-system 0 of the OLS estimation (at the 5 percent level). The positive coefficients suggest that clearing imports were not predominantly driven by exogenous factors, but on the contrary, that simultaneous equation bias dominated any substitution effect that might have existed between demand for domestic and clearing area flows. This view is further supported by the fact that the estimated coefficients on import prices are higher when mc_j is included. Possibly, an increase in import prices caused the demand for both domestic and clearing area flows to increase, so for a given clearing area flow, the effect of import prices on domestic flows was higher. Therefore, in the remainder of this chapter, we focus on the specification excluding clearing area imports—columns 2 and 4 of Table 5.4.

The OLS and IV estimations give similar results as far as the magnitude of the estimated coefficients (with the important exception of b_y^1, and b_y^0 as discussed below) and their fits are very high, with adjusted R^2 of, respectively, 0.924 and 0.923.[47] Both the decline in the fit and the increase in the standard errors in the IV relative to the OLS estimation are marginal. In both estimations all estimated coefficients are significant at the 1 percent level with the exception, in the IV estimation, of that on import prices in sub-system 0, b_p^0, and labor in sub-system 1, b_e^1, which are significant at the 5 percent level. All estimated coefficient signs are those expected.

Tests of the homogeneity of the coefficients across the two sub-systems based on the t-statistic of the difference between the estimated coefficients of a variable in the two systems, and those based on the change in the fit of the regression when a variable coefficient is constrained to equality across the two systems, give very similar results. In the OLS estimation only two of the estimated coefficients are significantly different across the two sub-systems. The coefficient on capital is significantly larger in intra- than in inter-regional flows, and the difference is significant at the 1 percent level (marked with two stars in Table 5.4). The difference is large: while the capital elasticity of supply is 1.111 in intra-regional flows, it is only 0.413 in inter-regional flows.

The OLS estimates of the coefficient of disposable income in intra-regional flows is smaller than on inter-regional flows, and the difference is significant only at the 10 percent level (marked in Table 5.4 with a star). This could be evidence against the hypothesis of a bias for intra-regional flows. However, instrumentation reverses the sign of this difference

[47]The R^2 refer to the variables after the means have been removed. Otherwise, they would be even higher.

Table 5.4. Intra-regional Trade Bias, 1970–87: Equation 5.14—Unrestricted Regression Results[1]

	OLS I	OLS II	IV I	IV II
k_i^0	1.025**	1.111**	1.108**	0.978**
	(0.22)	(0.22)	(0.51)	(0.24)
l_i^0	0.525	0.521	0.613	0.604
	(0.21)	(0.22)	(0.23)	(0.23)
y_j^0	0.424*	0.473*	0.492	0.57
	(0.08)	(0.08)	(0.15)	(0.10)
p_m^0	0.164	0.132	0.167	0.127
	(0.06)	(0.05)	(0.07)	(0.06)
ctl	0.333	0.409	0.286	0.411
	(0.13)	(0.12)	(0.22)	(0.12)
mc_j^0	0.070	...	0.050	. . .
	(0.04)		(0.04)	
trd^0	–0.054	–0.057	–0.064	–0.056
	(0.01)	(0.01)	(0.03)	(0.01)
k_i^1	0.363**	0.413**	0.332**	0.514**
	(0.17)	(0.16)	(0.39)	(0.19)
l_i^1	0.497	0.482	0.458	0.462
	(0.20)	(0.20)	(0.21)	(0.20)
y_j^1	0.592*	0.610*	0.569	0.531
	(0.08)	(0.07)	(0.25)	(0.11)
pm^1	0.162	0.156	0.161	0.155
	(0.04)	(0.04)	(0.04)	(0.04)
mc_j^1	0.026	...	0.038	...
	(0.03)		(0.04)	
trd^1	–0.039	–0.041	–0.035	–0.044
	(0.01)	(0.01)	(0.02)	(0.01)
Observations	192	192	192	192
Degrees of freedom	155	157	155	157
Standard error	0.071	0.071	0.071	0.072
Residual sum of squares	0.779	0.797	0.789	0.812
Adj. R^2	0.925	0.924	0.924	0.923
F-statistic	199.0	235.9	196.1	231.1

[1]Standard errors are in parentheses. Coefficients for which the difference in estimated value for inter- and intra-regional flows is significant at the 1 percent level are marked with **. Those for which the difference is significant at the 10 percent are marked with *.

by reducing the estimated coefficient on inter-regional flows, as expected, and increasing the estimated coefficient on intra-regional flows, also as expected. The change in the size of each of the estimated coefficient is not very sinificant, only by about one standard error. However, the two changes together eliminate the difference between the two coefficients, and this, in turn, removes the ambiguity in the overall pattern of coefficients. After instrumentation, all coefficients in intra-regional trade are either larger or the same as in inter-regional, which unambiguosly supports the hypothesis of there being a bias for intra-regional trade.

We cannot rule out the possiblity that better instruments would have given a significantly larger income coefficient in intra- than in inter-regional trade. However, the consistency with which the instruments perform when one of them is dropped at a time, and the fact that the tests performed in the analysis of the error structure of the regression suggest that the systematic components in the error term are not very powerful, enhance the probability that the homogeneity of the IV coefficient on income is true.

This is an interesting finding since the hypothesis of homogeneity cannot be rejected for all other estimated beta coefficients and the trend either. Such consistency suggests that the bias for intra-regional trade was not a generalized phenomenon, but instead was closely linked to the capital investment process.

To test for the robustness of the obtained results, we run equation 5.14 in the same set-up as described, but include time-specific dummies. Note that we add the time dummies to the model that takes variables in mean-deviation form over time; therefore, in this specification both time-specific and individual-specific effects are removed.

The inclusion of the time-dummies increases the collinearity, and consequently, the standard errors of the coefficient estimates. However, with one exception, the coefficient estimates increase as well, so that they remain significant. Moreover, their basic pattern remains unchanged (results not shown). The exception is that the estimated coefficients on prices of imports become insignificant, both in the case of inter- and intra-regional flows. Considering that the price indices are partly estimated (see Appendix III), it is not surprising that their effect becomes insignificant once both the cross-sectional and time-specific components are removed—the remaining variability in the observed statistical variable is probably largely measurement error. More importantly, however, the effect of capital, labour and income remains significant even when both the time-specific and individual specific effects are removed. Also, as in the main estimation, the OLS coefficient on income, *yj*, is significantly larger and that for capital, *ki*, significantly smaller, for inter- than for intra-regional flows. However, when income is instrumented, the difference between the income coefficients estimated for the two types of flows becomes insignificant. The only variable whose coefficient estimates remain significantly different for the two types of flows is capital—with that for intra-regional flows larger than that on inter-regional flows. This confirms our earlier finding that there is evidence of a bias in favor of intra-regional flows.

5.4.2 System 5.14—Final Specification

Table 5.5 shows the estimation results of the final specifications obtained when those variables whose coefficients' homogeneity cannot be rejected are treated as one variable. In all the specifications in the table, capital is allowed to differ across the two sub-systems, and,

of course, the control variable is specific only to intra-regional flows. The first two columns give the OLS results when, respectively, the coefficient of income is also allowed to differ across the two sub-systems, and when it is treated as a homogeneous variable. The third column gives the IV estimate in which income is treated as a homogenous variable. The estimated coefficients of the variables that are homogeneous across the two systems are shown in the lower portion of Table 5.5 and the variable names carry no superscript.

The OLS estimate with a heterogenous income coefficient is given for the sake of comparison. The heterogenous income coefficients interact with the capital coefficients. Once the income coefficients are restricted to homogeneity, the difference in the size of b_k^0 and b_k^1 is also reduced. Interestingly, the coefficient estimates in the restricted OLS and the IV estimations are nearly identical. Apparently, the bias of the income coefficients in the two types of flows cancels out, and once those observations are pooled instrumenting has no effect.

The estimated elasticity of intra-regional flow supply with respect to changes of capital across time (column 3 of Table 5.5) is 0.9; in inter-regional flows, the elasticity of flow supply with respect to capital is about 0.5. Since the elasticity of flow supply to labor (for both kinds of flows) is about 0.5, one might be tempted to consider this as evidence of economies of scale in production. Recall, however, that the observed flows consist of gross sales (excluding retail sales), with substantial cross-hauling and double counting included, so the parameters of our estimation are far removed from production function parameters and such inferences should not be made.

Table 5.5. Intra-Regional Trade Bias, 1970–1987: Equation 5.14—Final Restricted Specifications[1]

	OLS 1	OLS 2	IV 3
k_i^0	0.919	0.901	0.901
	(0.13)	(0.13)	(0.15)
y_j^0	0.482	...	...
	(0.07)		
ctl	0.489	0.472	0.472
	(0.10)	(0.10)	(0.10)
k_i^1	0.498	0.541	0.541
	(0.13)	(0.12)	(0.14)
y_j^1	0.587	...	...
	(0.07)		
l_i	0.503	0.517	0.517
	(0.15)	(0.15)	(0.15)
y_j	...	0.535	0.535
		(0.05)	(0.08)
p_m	0.144	0.143	0.143
	(0.03)	(0.03)	(0.03)
trd	-0.046	-0.047	-0.047
	(0.01)	(0.01)	(0.01)
Observations	192	192	192
Degrees of freedom	160	161	161
Standard error	0.071	0.071	0.071
Residual sum of squares	0.808	0.813	0.813
Adjusted R^2	0.924	0.924	0.924
F-statistic	338.4	394.3	394.3

[1]Standard errors in parentheses.

The estimated coefficient on disposable income, y_j, is around 0.5; that on import prices is 0.14—relatively low, which is not surprising considering that import demand was highly inelastic. The estimated coefficient of the control variable is also around 0.5. Finally, the trend is negative and relatively high, –0.05, suggesting that domestic trade in former Yugoslavia over the 18 years of observation ended 60 percent lower than it would have been in the absence of some unidentified factors. We have no conjectures on what these factors might have been—possibly the declining efficiency of production factors, or some structural changes that reduced the extent of cross-hauling and double counting in the trade data. We consider it remarkable, however, that these factors affected inter-regional flows just the same as they affected intra-regional flows.

CHAPTER SIX

PRODUCTION STRUCTURE AND INTER-REGIONAL TRADE

In the present chapter we empirically gauge the claim that an investment structure deliberately aimed at increasing the self-sufficiency in domestic trade, that is, autarky relative to the rest of the country, of the regions of the former Yugoslavia resulted in the country's increasing economic disintegration over the two decades preceding the country's political dissolution.[48] Conceptually, the argument consists of three elements: (a) the similarity between regional production structures increased, that is, the regions were despecializing; (b) despecialization reflected import substitution; (c) import-substitution was necessarily the result of pursuit of a self-sufficient economic structure by the regions. If (b) and (c) were true, it would suffice to observe (a), that the former Yugoslav regions have despecialized, and conclude that there is evidence that the institutional set-up of the economy led to economic disintegration. (This was implicitly the reasoning of Kraft (1989) and Burkett and Škegro (1987)). However, as argued in Chapter Two, import-substitution may be a result of technological factors; moreover, we argue in the next section that

[48]Throughout this chapter we assume that regions took their domestic dependence on the rest of the world (ROW) and the complementarity of their production structures with that of the ROW as a given. Moreover, we assume that these were not significantly affected by observed changes in complementarity of production structure among the regions. For simplicity, in further text the terms "self-sufficiency" and "autarky" will refer to trade relations solely among the regions, and will not denote the absence of regional trade with the ROW.

despecialization may not necessarily reflect import-substitution. Therefore, all three components of the reasoning above have to be supported by evidence before we can conclude that institutional factors lead to increasing economic disintegration.

In section 6.2 we first present two measures of divergence of regional industrial structure and in section 6.3 we show that, indeed, over the period of analysis the regions of former Yugoslavia increasingly despecialized over the period of our analysis. Next we proceed to test (b), the proposition that the despecialization observed is evidence of import-substitution. In section 6.4 we developed a model of demand for inter-regional trade that incorporates measures of industrial structure divergence and diversification as factors affecting regional preferences for other regions' goods. In section 6.5 we implement the model and in section 6.6 we present the estimation results.

In the absence of adequate data we cannot test for (c), i.e., rule out the possibility that import-substitution was the result of technological rather than institutional factors. We take care of this indirectly, however, by testing separately for import-substitution in flows whose technological underpinnings can be expected to differ widely: sales from/to developed regions to/by less developed regions. It is unlikely that trade flows between and within this two groups of regions would have been affected by the same technological factors. Therefore, the presence of import-substitution in trade between developed and less-developed regions, as well as among the less-developed regions themselves, would lend strong support to the view that import-substitution was the result of institutional factors.

6.1 Regional Specialization and Interregional Trade

The concepts of regional specialization and the comparison of regional production structures were introduced into mainstream economics in the work on economic geography by Paul Krugman (1991b). The theoretical relationship between regional specialization and trade flows has not, to our knowledge, been given explicit attention anywhere so a short discussion of the relationship between trade flows and specialization patterns is included below. As to empirical work, H. Linnemann (1966) used indices of similarity of the commodity composition of regional export and import flows as an additional variable in his classical study of the gravity model of international trade. The indices[49] he tried turned out statistically highly significant and improved the fit of the model.

In a loose sense, the complementarity between the production structures of a set of regions increases with regional specialization. In the absence of non-traded goods production, a group of regions would be completely specialized if any commodity that was produced by one of them, was not produced by any other. Clearly, since there are always some non-traded goods that must be produced by all trading partners, they will be present in the industrial structure of all the regions. Complete specialization will be achieved if any traded commodity that was produced by one of them was not produced by any other. We will also use the terms "divergence" and "similarity" to compare production structures. Two regional production structures will be considered fully divergent if they are completely

[49]Linnemann measured the similarity of the export and import structures of the trading countries with two alternative indices: the dot product and the cosine of the angle between the vectors of the industry shares in the total exports of the exporting country and the total imports of the importing country.

specialized. Similarity is the inverse of divergence. Two regions have identical production structures if the share of each industry in the total output of each region is the same.

In this study we consider a positive association between production complementarity and trade, coupled with the observation that complementarity declined, as evidence of import-substitution in trade among the regions. In the case of former Yugoslavia it was often implicitly assumed that a decline in specialization was necessarily associated with declining inter-regional trade, but this is not necessarily true. For a positive association to necessarily hold, first it must be true that industries consist solely of homogeneous goods, i.e., that the elasticity of substitution in consumption for all commodities within each industry. An increase in the *observed* similarity of production structures between two regions does not rule out the possibility that an *unobserved* increase in intra-industry division of labor has happened.[50] In that case, there may be no clear association between specialization and trade, or, conceivably, there could be a negative association between specialization and trade.

If industries are homogenous, a decline in the complementarity of production structures of two economies necessarily reflects import-substitution between them, and vice-versa, only if in addition, we assume the following, rather stringent, conditions: (a) there are no other trading partners; (b) the structure of consumption and technologies of both regions

[50]We reserve in this Chapter the term "specialization" to denote its traditional meaning of "inter-industry specialization" relating to conventionally defined industries. To avoid confusion, we will use the term "intra-industry division of labor" when we want to refer to "intra-industry specialization".

are the same; (c) there is no trade in intermediate goods; and (c) there is no differential growth in factors of production.[51]

The practical restrictiveness of these technical conditions is not the same for all of them. It is, in our opinion, unlikely that the relaxation of any of the assumptions (a)–(c) above would invalidate the relationship in practice. Possibility (d), however, is more likely to lead to a breakdown in the causal relationship between industrial similarity and import-substitution. All it takes is for a region to be investing in the development of some factors of production that will allow it to produce some imported goods, but just enough to satisfy the growing demand for these goods, and not necessarily to import-substitute.

In the present study we observe production structures of the former Yugoslav regions at two levels of industrial aggregation. One is equivalent to a two-digit classification, classifying all material production into 45 industries. The other is a far more detailed classification of manufacturing and extractive industries into approximately 650 industries. Only with the two-digit classification do we measure specialization in the traditional sense of the word. With the detailed industrial classification we tread in less well defined waters. While there is still room for further intra-industry division of labor, products of two industries may be highly substitutable and we cannot think that at that level of aggregation we observe specialization in the traditional sense of the word.

Existing observations on the specialization patterns among the nine U.S. census regions confirm the fact that despecialization alone need not be an expression of

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[51]Surely analytical conditions could be found under which these conditions could be relaxed, but this is beyond the scope of our analysis.

disintegration and may well be associated with increasing integration. A detailed historical analysis by Sukko Kim shows that "as the U.S. regions integrated economically between 1860 and 1890, regional manufacturing structure became more specialized at both the 2 and 3 digit levels of industry aggregation. It continued to specialize through the turn of the century and plateaued around the early 1930s. Since then it has despecialized continuously and substantially through 1987 to the point where U.S. manufacturing is less regionally specialized today than it was in 1860." (Kim, 1992, p. 80). While there are no observations of U.S. interregional trade that would provide evidence of the effect of the changes in specialization patterns on trade, it would be hard to imagine that this despecialization was associated with declining levels of inter-regional trade in the US. Even if they had been, we would expect that the cause for import-substitution were technological rather than disintegrative non-economic factors.

In the case of the Yugoslav regions, if we observe import-substitution we cannot rule out that it was the result of technological factors such as: (a) a decline in the importance of externalities of agglomeration; (b) a decline in economies of scale relative to market size; and (c) an increase in transportation relative to other costs. The test in this chapter, however, is based on the assumption, that these are either unlikely to have happened or are unlikely to have uniformly affected all Yugoslav regions in the period of observation. Finally, an important possibility that cannot be assumed away is that despecialization and possibly declining inter-regional trade were the result of economic development of the less-developed regions. As argued in Chapter Two, the development of new factors of production may render it efficient to import-substitute from the rest of the world, including fellow regions.

In sum, while numerous factors might have resulted in increasing de-specialization and import-substitution for some regions, we believe that a generalized association of despecialization and import-substitution in the case of former Yugoslavia would be strongly indicative of disintegration being driven by institutional factors.

6.2 Measurement of Specialization

We use two types of indices to measure the complementarity of industrial structures of two regions i and j, D_{ij}. Denote with V_{ki} the (constant price) value of net output of industry k in region i and with V_i the value of total net production of region i, also at constant prices. Assume that there is a total of n industries.

(1) One index, we shall call it the Euclidean index for short, is obtained as

$$D_{ij} = [\sum_{k=1}^{n} (\sqrt{\frac{V_{ki}}{V_i}} - \sqrt{\frac{V_{kj}}{V_j}})^2]^{1/2} \qquad \begin{matrix} k = 1,\ldots,n \\ i,j = 1,\ldots 8 \end{matrix} \tag{6.1}$$

This index is a derivation from the Euclidean distance between regions represented as points in the space of the square roots of industrial shares in total regional productions. Instead of distributing the vector points of regional industrial shares on the unit simplex, as the Euclidean distance would do, after transforming the variables by taking the roots of the shares the vector points become distributed on a sphere of unit radius. This transformation was done for practical reasons: when industry size is uneven, as it is in our case, the transformation helps increase the weight of smaller industries. The value of the index ranges

between 0 and $\sqrt{2}$, however, instead of between 0 and 1 as it would with the Euclidean distance.

(2) The second index is obtained as the sum of the absolute differences between industrial shares:

$$D_{ij} = \sum_{k=1}^{k=n} \left| \frac{V_{ki}}{V_i} - \frac{V_{kj}}{V_j} \right| \qquad \begin{matrix} k = 1,\ldots,n \\ i,j = 1,\ldots 8 \end{matrix} \tag{6.2}$$

This index was used in Krugman (1991) and Kim (1992) and for simplicity, it will be called the Krugman index. Its values range between 0 and 2.

The larger the complementarity index, the more divergent are the two industrial structures. And conversely, the smaller the complementarity index, the more similar the two production structures. By construction, the Euclidean index gives more weight to smaller industries and this could be desirable if we are interested in emerging industries, or if the industrial aggregation at issue is very uneven.

While D_{ij}, measured through either method, has the advantage of being a well identified measure of the complementarity of two regional production structures, its disadvantage is that it does not speak of either of the two regions' production structures independently. For example, if D_{ij} increases, we have no way of knowing whether this was driven by a change in region i's or region j's production structure. Moreover, observing changes in D_{ij} might be misleading in a situation where there are more than two regions involved. Changes in D_{ij} might actually be driven by processes involving trade of one of the two regions with a third region. In particular, in the presence of more than two regions

import-substitution by one of the regions from the other does not necessarily result in declining production complementarity between the two. For example, region 1 may be import-substituting from region 2, but region 2 may be increasing its integration with region 3 and therefore specializing to such an extent as to result in an increase, rather than decline, of D_{12}.

Ideally, to speak of the specialization of a region without making reference to any other region, one would want to compare its production structure with that obtaining in autarky. In our specific case we consider two possibilities for the approximation of the autarkic production structure. Recall that we use the term "autarky" in the sense "no trade with the ROC", but we do allow that there will be trade with the rest of the World. Therefore, under the assumption that consumption structures were uniform across regions, the production structure of the country as a whole is a good approximation of the autarkic production structure for any region. Unfortunately, measuring region *j*'s production structure complementarity by comparison with an entity that contains region *j* itself creates serious problems of simultaneity, and biases the measure of complementarity against larger regions.

An alternative is to approximate the autarkic production structure for each region with the production structure of the ROC, excluding the region. A comparison of production structures with that of the ROC would be meaningful even if the structure of the ROC were not a good approximation of the autarkic structure. However, the structure of the ROC may be a good approximation of the autarkic structure for each region if none of them is too specialized and too large. Our analysis of regional specialization in former Yugoslavia,

reported below, suggests that the ROC is a good approximation of the autarkic structure for all regions.

In sum, for each region j we observe two characteristics: the complementarity of its production structure with that of each other region in the country, D_{ij}; and its complementarity with the ROC, D_{rj}, where r stands for ROC.[52] The advantages of the measure D_{rj} are that it talks of region j with reference to an aggregate of regions whose production structure may be expected to be more stable than that of any individual region, and that it analytically brings us back to a universe of two regions—if region j import-substitutes from the ROC, D_{rj} will decline. Its disadvantage is its lack of specificity. If region j is import-substituting from some regions but not from all, it may tell us little.

To measure the specialization of a group of regions as a whole, we can simply average either all pairwise complementarities, or all regions' complementarities with the autarkic production structure.

6.3 The Specialization of Former Yugoslav Regions

We observe production structures at the level of two industrial classifications:

(a) a two digit classification where all material production is divided into 45 industries, available for the entire 1952–1987 period. In this classification, manufacturing and the extractive industries are broken down into 35 industries. Agriculture, and construction comprise one industry each, and the remaining industries are services that

[52]The industrial structure of the ROC was obtained by aggregating the production of all regions other then region j, and then observing the shares of each industry in the total.

qualified as productive activities according to Marxist economics, for example, transportation, trade and tourism. These ten latter industries tend to obscure the more interesting processes reflected in the structure of manufacturing. For example, agriculture is a very large aggregate—its breakdown cannot be obtained in a form that could be used for our purposes—which makes it dominate the behavior of the index without giving meaningful information about a region's specialization. The other industries consist largely of non-traded goods and also have relatively large and similar shares across regions. Therefore, we measure production structure based on the 35 industries comprising manufacturing and extractive production alone.[53]

(b) We also measure industrial structure based on a detailed classification of manufacturing and extractive industries, consisting of approximately 650 product groups. This detailed classification was available only in the years 1970, 1975, 1983, and 1987.

Preliminary estimations showed that the picture of regional specialization obtained by observing average pairwise complementarities, D_{ij}, for, say, region j, was similar to that obtained by observing D_{rj}. Similarly, the trends in overall regional specialization measured by averaging all *Dijs* at a point in time, or by averaging all *Drjs* at a point in time, were very similar.

Table 6.1 gives the indices of regional specialization obtained by averaging pairwise complementarities, according to both the two-digit and the detailed industrial classifications, and measured by both complementarity indices. At the 2-digit aggregation level, regional

[53]As described in Chapter One, Burkett and Škegro (1987) find no despecialization because they include agriculture in their industrial structure.

Table 6.1. Production Structure and Inter-Regional Trade: Index of Regional Industrial Specialization

	35-industry classification		Detailed classification	
	Krugman's index	Euclidean distance	Krugman's index	Euclidean distance
All regions				
1952	1.199	0.819	...	...
1970	0.828	0.600	1.330	0.974
1975	0.794	0.571	1.393	1.013
1983	0.745	0.543	1.231	0.903
1987	0.737	0.529	1.262	0.923
Developed regions				
1952	0.724	0.525	...	...
1970	0.539	0.415	1.047	0.797
1975	0.575	0.415	1.158	0.864
1983	0.535	0.398	1.055	0.777
1987	0.564	0.406	1.086	0.799

specialization declined between 1952 and 1987 by over 20 percent of the maximal value according to both indices. Only one-quarter of that decline occurred between 1970 and 1987, the period of our analysis.

The evolution of specialization, however, differs for developed and less-developed regions. Developed regions were significantly more diversified and industrialized at the outset, in 1952, than was the rest of the country. At the 2-digit industrial level, their specialization declined slowly up to the 1970's and thereafter stagnated. At the detailed aggregation level, their specialization after 1970 fluctuated in a relatively narrow range,

possibly with a slight tendency to increase. (The tendency is driven mainly by an increase in the complementarity of Serbia proper's industrial structure with that of the rest of the country).

No decline in complementarity among developed regions is by itself evidence against the claim that these regions import-substituted from one another. This alone could provide evidence against the claim that the regions pursued import-substitution for institutional reasons, since there is no reason why institutional factors would spare the relationship between some regions and not others.

There is, however, a possibility that the industrial disaggregation used in the present study is not sufficiently fine to adequately capture the evolution of the more sophisticated industrial structures of developed regions. One could argue that the diversification of the developed regions' industries had reached a plateau at more aggregate levels, but that at a finer level, developed regions continued to import-substitute against each other. It could also be argued that there are limits to the extent of diversification that an economy can attain, and that these were possibly reached by the former Yugoslav developed regions.

In the case of less-developed regions, the complementarity among their industrial structures and between their structures and those of the developed regions (not shown here separately) declined clearly and markedly throughout the whole period of observation for both industrial aggregations.

The evolution of the production structure of former Yugoslav regions suggests that we are unlikely to be plagued by ambiguities of interpretation of our results owing to disparate tendencies in the specialization patterns of individual regions or groups of regions.

No region, or group of regions, shows a clear tendency of specializing or maintaining a separate character over time, despite the slight meandering of Serbia Proper's production structure in the latter years. A clustering analysis of regional production structures performed at the 2-digit level of industrial aggregation showed a clear tendency over time for all regional production structures to cluster more closely.

As the production structure of the larger (more developed) regions was relatively highly diversified already at the beginning of our period of observation, and because of the tendency of all production structures to cluster increasingly closely, for each region the structure of the ROC is relatively close to that of the country as a total. This suggests that the use of the structure of the ROC as an approximation of the autarkic production structure is reasonable for all regions.

6.4 The Model

We turn now to the demand side of the generic model of inter-regional trade presented in Chapter Four. We focus on the structural parameters B_{ij} in order to develop a link between regional specialization and the determination of the territorial distribution of bilateral trade. We base our analysis on the assumption that a stable relationship exists between the complementarity of regional production structures and the parameters determining preferences in the demand for bilateral purchases among them. We assume, further, that the rest of the world produces the universe of goods available, and that changes in regional production structures are too small to affect the complementarity of the regional production structures and the universe.

While in the previous chapter the focus was on the determination of trade within a region versus trade with the rest of the country as one aggregate, we here focus on the determination of the bilateral inter-regional flows. We drop intra-regional trade from the analysis since the concept of complementarity can be used only as an explanatory variable for flows between two different regions. For each region at each point in time we observe seven flows, purchases from each of the other regions in the country, a total of 56 flows at each point in time.

Consider the demand determination model (4.2) of Chapter Four, but assume now that there are eight, instead of two, regions. The model becomes

$$(6.3)\quad X_{ij}^{d} = d(Y_j, B_{ij}, T_{ij}, P_{jj}, P_{1j}, \ldots P_{(j-1)j}, P_{(j+1)j}, \ldots, P_{8j}) \qquad \begin{array}{l} i = 1, \ldots\ldots\ldots, 8 \\ j = 2, \ldots\ldots\ldots, 7 \\ \text{and } i \neq j \end{array}$$

$$X_{ij}^{d} = d(Y_j, B_{ij}, T_{ij}, P_{jj}, P_{2j}, \ldots, P_{8j}) \qquad \begin{array}{l} i = 2, \ldots\ldots\ldots, 8 \\ j = 1 \end{array}$$

$$X_{ij}^{d} = d(Y_j, B_{ij}, T_{ij}, P_{jj}, P_{1j}, \ldots, P_{7j}) \qquad \begin{array}{l} i = 1, \ldots\ldots\ldots, 7 \\ j = 8 \end{array}$$

where we retain the notation used in Chapter Four, that is, X_{ij}^{d} is region j's demand for goods produced in region i, Y_j is the disposable income of region j, B_{ij} are the preference parameters affecting region j's choice, T_{ij} are transportation costs, P_{jj} is the price of region j's own product, and $P_{1j}, \ldots P_{8j}$ are the seven prices of the bilateral flows in which j purchases from other regions.

We consider four production structure factors that can be expected to affect preferences B_{ij} in a stable manner. Two are the ratios of the number of industries present in the seller and buyer regions to the total number of industries present in the country,

respectively, N_i and N_j.[54] The other two are the pairwise complementarity of the seller- and buyer-region production structures, D_{ij}, and the index of complementarity of the buyer-region with the autarkic production structure, D_{rj}.

We argued in section 6.2 that if a region is pursuing an autarkic production structure, that is, import-substituting from other regions, we expect to find declining complementarities with the autarkic and trading partner production structures, and that the association between the complementarities and trade would be positive. In other words, for both D_{ij} and D_{rj}, a positive effect on bilateral trade would be evidence of import-substitution.

The situation is less clear-cut with N_i and N_j. The number of industries in region j is directly related to the availability of goods in j. This, in turn, can be expected to have a negative effect on j's trade openness, that is, growth in N_j can be expected to be associated with import-substitution, but this could easily be the result of technological reasons, associated with growth. The effect of N_j in this context is in fact no different from the well known negative effect of economic size on country's openness to international trade. Moreover, we expect the effect of N_i on region j's preference for region i's goods to have the opposite effect on inter-regional trade: the greater the number of industries in i, the higher is the probability that j will find the goods it needs in it. That is, the effect of the number of industries in the seller-region on the buyer-region's preferences is expected to be unambiguously positive.

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[54] Data limitations, explained in Appendix III, do now allow the use of the absolute number of industries present in region.

Yet, as the inherent indeterminacy of optimal resource allocation in the presence of IRS (discussed in Chapter Two) suggests that diversification can be higher or lower at any given size, and, moreover, as purposeful import-substitution might have led to the introduction of new industries at sub-optimal scales, faster diversification may be an indicator of a region's particular "keenness" towards import-substitution, possibly driven by institutional factors. The diversification, however, of region *j* might have a positive effect on trade when region *j* appears in the position of seller region. Therefore, all we can say is that a positive effect of N_i that is larger in absolute terms than a negative effect of N_j can be interpreted to indicate that the effect of diversification on trade creation among the regions outstripped that on trade diversion, presenting evidence against import-substitution, and vice-versa if the negative effect of N_j is absolutely larger than the positive effect of N_i.

There is a measure of overlap in the content of D_{rj} and N_j, and in the content of D_{rj} and D_{ij}, and their joint inclusion in the model may not necessarily be justified. A decline in the complementarity with the ROC, D_{rj}, consists either of region *j*'s industrial diversification, or of changes in industrial shares bringing them more closely in line with those in the ROC, or both. If we control for N_j, therefore, D_{rj} will capture solely the effect of more similar industrial shares. While similarity of industrial size ought to increase with import-substitution, in practice this effect may be quite weak.

The overlap between D_{rj} and D_{ij} is even closer. While it is possible that D_{rj} declines while D_{ij} for some *i*'s increases and for others declines, if D_{ij} declines for all *i*'s, D_{rj} must decline as well. In our case, we know that the D_{ij}s declined rather consistently across the

regions. If this tendency was driven by a rather uniform and generalized tendency towards import-substitution, we can expect that D_{ij} and D_{η} will be collinear.

Therefore, we start our estimations with D_{η} and D_{ij} as alternative measures of industrial complementarity. This gives us two alternative sets of determinants of the preference parameters B_{ij}

$$(6.4)\quad B_{ij} = f^1(N_i, N_j, D_{\eta}) \qquad i = 1, \ldots, 8$$
$$B_{ij} = f^2(N_i, N_j, D_{ij}) \qquad j = 1, \ldots, 8$$
$$\text{and } i \neq j$$

Also, when we use D_{η}, we do it both including and excluding N_j. Substituting the two sets of factors for B_{ij} in equation (6.3) gives us two alternative models for the determination of demand for bilateral flows, whose implementation is discussed in turn.

6.5 Model Implementation

6.5.1 Complementarity of Production Structures

The parameters determining the effect that changes in specialization may have on preferences for bilateral flows is likely to vary for each pair of regions, depending on the set of goods that comprise their outputs, and on their technologies. It would be best, therefore, to allow for purchasing-region-specific coefficients on the D_{η}, and for flow-specific coefficients on D_{ij}. However, there are not enough observations of each flow (only five) for such a differentiation.

We can allow for some variability in the effect of specialization based on the assumption that the level of development of the trading regions is of overwhelming relevance

for the way in which preferences and production structures are linked. We allow for the possibility that the coefficient on D_{ij} differs depending on whether the buyer and seller are developed or less-developed regions, by introducing four dummy variables marking a developed or less-developed buyer or seller region, and to interact them with the index D_{ij}. We denote the dummy for a developed seller region with SR^d, for an under-developed seller region with SR^u, for a developed buyer region with BR^d, and for an under-developed buyer region with BR^u. Therefore, we allow for the differentiation of coefficients on pairwise complementarity in four types of flow: trade among developed regions $SR^d\ BR^d D_{ij}$, sales from less-developed to developed regions, $SR^u\ BR^d D_{ij}$, sales from developed to less-developed regions, $SR^d\ BR^u D_{ij}$, and trade among less-developed regions, $SR^u\ BR^u D_{ij}$.

We also differentiate between D_{ij} if region j is developed, and if it is underdeveloped, $BR^d D_{ij}$ and $BR^u D_{ij}$, respectively.

6.5.2 Other Variables

The stylized facts of former Yugoslavia and data problems discussed in Chapter Five are valid for this application as well. We therefore retain p_{mj} as a proxy for the joint effect on demand of import prices and the shadow price of foreign exchange; and we proxy regional disposable income with our estimate of regional absorption. Since we only analyze inter-regional flows, we need not control for enterprise divisionalization. We do not include imports from clearing areas, Mc_j, in the present set as it has been shown to be endogenous to the system.

Model (6.3) has eight domestic price terms: one is the price of the flow at issue, another is the cross-price effect of supply of goods in region *j* itself, and the remaining six are cross-price effects of bilateral trade with regions other than *i*. As we do not observe the prices of the flows themselves, at best, we could use regional consumer price indices or deflators as proxies for the prices obtained in the bilateral trade flows. This is problematic.

We discard at the outset the possibility of proxying the cross-price effects other than that of region *j*'s own good, P_{jj}. First, recall, that *ij*, the flow that for analytical purposes we treat as one good, is in fact a highly aggregated flow whose aggregate price may not be very sensitive to cross-price effects. Second, the collinearity of the variables in the system is already high, and including so many price effects would probably make it untractable.

However, after conducting preliminary estimations using regional price deflators to proxy P_{ij} and P_{ij} we decide to discard these price terms as well. First, neither the consumer price index nor the regional deflator are likely to be very good proxies of prices attained in inter-regional trade. Second, the price terms need to be instrumented and the estimated coefficients appear to be highly sensitive to the choice of instrument, yet we have no criteria to determine which instruments are adequate. Finally, preliminary estimations show that with or without instrumentation the inclusion of the price proxies has little effect on the estimated coefficients of the other variables, of greater interest to us. Considering the uncertainties as to the meaning of these price coefficients, we conclude there is little gain from attempting to adequately control for the effect of prices and drop them from the final estimations altogether.

A word of caution is needed as to the interpretation of the results of the implemented model. For clarity of exposition, our discussion in section 6.4 assumed that we can identify the demand side of the determination of inter-regional bilateral flows as a structural relationship. However, the fact that we do not observe prices, and that the four production structure factors on which our analysis is focused are affected by numerous economic processes, do not allow us to expect to, indeed, be estimating a structural relationship. Rather, our implemented equation is analogous to a highly reduced form.

6.5.3 Econometric Specification

As in Chapter Four, and for the same reasons, we pool the available observations and adopt a fixed-flow-specific effects specification. This will sweep out the transportation cost factor, as well as any unspecified, time-invariant, flow-specific effects from the two formulations of equation (6.3). Finally, we adopt a log-linear specification. Substituting for B_{ij} the two sets of structural factors shown in equation (6.4), gives us the following two models

$$(6.5)\quad x^d_{ij} = \alpha_1 n_{i,t} + \alpha_2 n_{j,t} + \alpha_3 BR^d d_{rj,t} + \alpha_4 BR^u d_{rj,t} + \alpha_9 y_{j,t} + \alpha_{10} p_{mj,t} + v^1_{ij,t}$$

$$(6.6)\quad x^d_{ij} = \alpha_1 n_{i,t} + \alpha_2 n_{j,t} + \alpha_5 SR^d BR^d d_{ij,t} + \alpha_6 SR^u BR^d d_{ij,t} + \alpha_7 SR^d BR^u d_{ij,t} + \alpha_8 SR^u BR^u di_{j,t} + \alpha_9 y_{j,t} + \alpha_{10} p_{mj,t} + v^2_{ij,t}$$

$$i = 1, \ldots, 8;\ i \neq j;\quad j = 1, \ldots, 8$$

where lowercase letters denote the mean deviations of the logarithms of the variables in uppercase letters. The error terms, $v^1_{ij,t}$ and $v^2_{ij,t}$ are assumed to be *iid*.

Preliminary estimations also show that, unlike in the previous chapter, the instrumentation of y_j has a negligible effect on the estimated coefficients, especially when production specialization is measured with the Euclidean complementarity index. The choice of instruments (several combinations of the variables discussed in the previous chapters as well as regional GMPs have been tested as instruments) does not seem to matter much either. This is probably explained by the fact that the bias was created by derivation of the measures of y_j from aggregated flows. The errors of such flows are possibly dominated by systematic region-specific components. The bilateral-flow-specific components of the errors may cancel out in the aggregation into total regional ROC sales and purchases. The errors of the bilateral-flows, however, might be dominated by these bilateral-flow-specific factors. We therefore apply only OLS to equation (6.5).

We implement equation (6.5) on four different sets of measures of industrial structure divergence: the Euclidean and the Krugman indices applied to the detailed industrial classification (specification I and II, respectively), and the Euclidean and the Krugman indices applied to the 35 industry classification (specification III and IV, respectively).

In order to be able to use the trade observations for 1974 and 1976, two years that are very close to 1975, we linearly extrapolate the indices of complementarity of industrial structure. We extrapolate the indices of industrial complementarity rather than the industrial structures themselves because the detailed industrial classifications in the earlier and later years of the period could not be made perfectly compatible.[55] However, we consider the years

[55]The procedures used to bring the classifications to a satisfactory degree of compatibility, and the sensitivity of the indices to differences in classification such as the ones we have in the final data, are described in (continued...)

1978 and 1980 to be too far from any point in time when industrial structures were observed, and therefore do not estimate the complementarity indices for these years for inclusion in the regression, but rather exclude the years from the analysis altogether.

Note that the regional shares in the total number of industries in the country, n_i and n_j, need to be measured based on the detailed industrial classification, as the share in the 35-industry classification for most regions throughout the period of observation is 1. Therefore, even when we use the 35-industry classification, we can include only 5 time periods in the analysis. Thus, we use only the flow observations for 1970, 1974, 1976, 1983, and 1987 throughout this Chapter.

6.6 Estimation Results

6.6.1 Complementarity with Autarkic Production Structure, Model 6.5

Table 6.2 presents the estimation results for equation 6.5. The four specifications of the estimated equation are given respectively in the four columns of the table. We discuss the estimated coefficients in turn.

The estimated coefficient for the number of industries in the seller-region, n_i, is positive, as expected, highly significant and not significantly different from 1 in all four specifications. An elasticity of demand to the number of industries in the seller-region of 1 seems high and it opens the question if, in addition to the effect on buyer-region preferences,

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[55](...continued)
Appendix III.

we may not also be capturing a supply-side effect. The number of industries in a region may be highly correlated with its productive capacity.

To control for this possibility, we test for the inclusion of seller-region capital in equation 6.5 (results not shown). The obtained coefficient on seller-region capital is insignificant, and its inclusion does not have a significant effect on the estimated coefficient of n_i or any other variables in any of the specifications. This suggests that n_i is not capturing the effect of resource availability. However, higher diversification may be correlated with insufficient utilization of economies of scale, which, in turn, would prompt suppliers to lower prices and increase market share. The possibility that we are capturing this kind of supply side effect cannot be ruled out.

When the 35-industry aggregation is used, the estimated coefficient on the number of industries in the buyer region, n_j, is negative and highly significant, but when the detailed industrial classification is used it is only barely significant in specification I, and not significant in specification II. The negative sign of the coefficient suggests that, as expected, the availability of a higher number of industries in a regional economy had a negative effect on its demand for goods from other regions. Its size varies widely (from –0.141 to –1.18), depending on the type of complementarity index used in the estimation (type of specification) confirming our expectation that there is overlap in the information contained in nj and d_{ij}. The interaction between these two variables is further discussed below.

In all the specifications, the absolute size of the coefficient on n_j is significantly smaller than that on n_i, suggesting that the trade creating effects of diversification are larger than the trade diverting effects. Only in specification III, when the Euclidean index and the

35-industry classification are used, the absolute size of the coefficient of n_j is not significantly different from the coefficient on n_i. However, the positive net effect of the two coefficients is significant only in specifications II and IV— where the sum of the coefficients with the standard errors given in parentheses are, respectively, 0.839 (0.28) and 0.637 (0.295).

The behavior of the production complementarity with the autarkic production structure index, d_η, differs substantially depending on the industrial aggregation used. Its estimated effect on trade is positive only in the case of purchases by developed regions, when the detailed aggregation is used, but even then it is completely insignificant in both specifications I and II. Contrary to expectations, the coefficient on complementarity has a negative effect on trade in all other cases, purchases of developed regions when the 35-industry classification is used, and purchases of less developed regions in all four specifications. When the 35-industry aggregation is used, the estimated coefficients for complementarity of both developed and less-developed regions is highly significant.

What these results say is that as regional production structures measured at higher levels of industrial aggregation became more similar to the autarkic production structure, both developed and less-developed regions tended to buy more from other regions, not less as we expected. This suggests that greater similarity with the autarkic production structure offered greater opportunities for intra-industry trade. To some extent, it could be that similarity with the autarkic structure at the 2-digit level of aggregation is an indicator, or proxy, for similarity in the type of technology employed. It is interesting that the effect of such similarity is not statistically different for developed and underdeveloped regions when

Table 6.2. Production Structure and Inter-Regional Trade: Model 6.5, OLS Estimation Results[1]

	Industrial Structure			
	Detailed classification		35-industry classification	
	Euclidean Index I	Krugman Index II	Euclidean Index III	Krugman Index IV
n_i	1.011	0.985	1.241	1.278
	(0.26)	(0.26)	(0.26)	(0.26)
n_j	–0.661	–0.146	–1.185	–0.641
	(0.38)	(0.27)	(0.37)	(0.32)
$BR^d d_n$	–0.101	0.083	–1.772	–0.754
	(0.53)	(0.25)	(0.64)	(0.21)
$BR^u d_n$	–0.999	–0.134	–2.016	–0.870
	(0.49)	(0.15)	(0.46)	(0.30)
y_j	0.768	0.693	0.618	0.646
	(0.09)	(0.08)	(0.08)	(0.08)
p_{m_j}	0.106	0.178	0.125	0.143
	(0.08)	(0.07)	(0.07)	(0.06)
No. observations	280	280	280	280
Degrees of freedom	218	218	218	218
Standard errors	0.200	0.202	0.192	0.193
Residual sum of squares	8.702	8.858	8.069	8.129
Adjusted R^2	0.597	0.590	0.626	0.624
F-statistic	94.9	92.5	105.8	104.7

[1]Standard errors are in parentheses.

nj is included in the regression. However, when we do not control for the effect of diversification of the buyer-region's economy, i.e. when *nj* is not included in the regression (results shown in Table 6.2a), the similarity of production structure makes a substantially

smaller contribution to the purchases of less developed regions (–0.926 as opposed to –2.016).

Moreover, our results tell that the complementarity indices measured at the 2-digit and at the detailed industrial aggregations do not appear to reflect the same kind of process. A decline in complementarity at the 2-digit level could be consistent both with an increase or a decline in complementarity at the detailed level. The fact that for developed regions the estimated coefficients on d_{rj} become insignificant, and for less-developed regions although negative they decline significantly in specifications I and II compared to specifications III and IV, tells us that, unsurprisingly, at lower levels of industrial aggregation the positive effect of increased opportunity for intra-industry trade is far weaker. In fact, for developed regions it is absent altogether. However, there is no evidence of import-substitution at the detailed level of aggregation either.[56]

Of all the coefficients in the regression, only those on the complementarity index for both types of flows and on n_j show significant sensitivity to the choice of index used for the measurement of complementarity. In both industrial aggregations, the negative effects of both industrial complementarity and of diversification are weaker when the Krugman index is used. Since the Euclidean index gives greater weight to smaller industries, this suggeststhat smaller industries play an important role in the processes captured by *nj* and

[56]It is interesting that the complementarity indices at the higher and lower levels of aggregation are not very correlated. The inclusion of d_{rj} measured at both industrial structures and interacted with buyer-region dummies in one single regression had a relatively small effect on the size of the estimated coefficients of each one of them.

d_{rj}—import-substitution associated with diversification and increased intra-industry division of labor at more similar production structures.

The estimated coefficient on income y_j ranges between 0.610 and 0.753, and it is significantly higher when the detailed aggregation is used. The lower estimates are close but still significantly higher than the coefficients obtained in Chapter 5. It is interesting that inclusion of seller-region capital in the estimation does not affect the estimated coefficient on y_j, suggesting that the difference is not due to the absence of supply side variables in the model (some correlation could have been expected between production factor availability and income of different regions because of the strong trend in both). An alternative explanation could be that large bilateral trade flows were less sensitive to buyer income fluctuations, and therefore biased downwards the sensitivity of the aggregate flows used in Chapter 5.

The estimated coefficient on the price of imports, p_{mj}, is positive, as expected, and its size is rather stable across specifications I, III and IV, ranging between 0.125 and 0.143. In specification II it is 0.181 and significant at the 1 percent level. As we will see below, this seems to be the result of interaction between p_{mj} and d_{rj}. Since d_{rj} in this specification is not significant, p_{mj} seems to capture some of the effect that d_{rj} has on trade in the other specifications.

6.6.2 Pairwise Production Complementarities, Model 6.6

Table 6.3 presents the estimation results for model 6.6. In this model, the complementarity indices refer to the pairwise complementarity of the trading region's

Table 6.2a. Production Structure and Inter-Regional Trade: Model 6.5, excluding n_j, OLS Estimation Results[1]

	Industrial Structure			
	Detailed classification		35-industry classification	
	Euclidean Index I	Krugman Index II	Euclidean Index III	Krugman Index IV
n_i	0.875	0.923	0.850	1.022
	(0.25)	(0.23)	(0.23)	(0.23)
$BR^d d_{rj}$	0.159	0.077	−1.730	−0.762
	(0.51)	(0.25)	(0.65)	(0.22)
$BR^u d_{rj}$	−0.352	−0.107	−0.926	−0.480
	(0.33)	(0.14)	(0.31)	(0.23)
y_j	0.708	0.687	0.611	0.635
	(0.08)	(0.08)	(0.08)	(0.08)
p_{mj}	0.142	0.171	0.099	0.134
	(0.08)	(0.07)	(0.07)	(0.06)
No. observations	280	280	280	280
Degrees of freedom	219	219	219	219
Standard errors	0.201	0.201	0.1963	0.194
Residual sum of squares	8.825	8.871	8.440	8.280
Adjusted R^2	0.593	0.591	0.611	0.618
F-statistic	116.8	115.9	124.6	128.1

[1]Standard errors are in parentheses.

industries, and the estimated coefficient values are allowed to vary depending on whether the seller/buyer region is developed or less-developed. It is interesting that in this model when the 35 industry classification is used the estimated coefficient of the number of seller-region industries, n_i, the number of industries in the seller region is substantially smaller than in model 6.5 (0.384, and insignificant in specification III, and 0.590, and significant at the 5 percent level, in specification IV). We have no explanation for this decline. Its size in

specifications I and II does not differ significantly from 1 and it is highly significant, as in model 6.5. The estimated coefficient on the number of buyer region industries, n_j is negative in all but specification II and generally insignificant. Once again, n_j tends to be more negative if complementarities are measured with the Euclidean index, than if they are measured with the Krugman index. When n_j is dropped, the change in estimated coefficients for all other variables is insignificant, but the increase in the coefficients on the production structure complementarity for flows from less developed to developed regions and for flows among less developed regions is noticeable.

As to the pairwise production complementarity, d_{ij}, once again, contrary to expectations at the 35-industry aggregation its estimated effect is negative or nil for all flows; however, it is significant only for trade among less developed regions. The estimated coefficient on $SR^uBR^ud_{ij}$ in specification III is –2.113, in specification IV it is –1.574, and in both it is significant at the 1 percent level.

When the detailed classification is used we do, at last, find a significant positive effect of production complementarity on trade, but only for trade among developed and less developed regions. The estimated coefficients on d_{ij} when the buyer is a developed region, $SR^uBR^dd_{ij}$, in specifications I and II are respectively, 0.792 and 1.042 (both significant at the 5 percent level). The estimated coefficients when the buyer is a less-developed region, $SR^dBR^ud_{ij}$, in specification I and II are respectively, 0.822 (significant at the 5 percent level) and 1.116 (significant at the 1 percent level). Considering the large standard error of the coefficient estimates, the difference between the coefficients when developed regions sell to or buy from less developed ones, is not significant.

That the effect of industrial similarity on purchases by developed from less developed regions does not significantly differ from the effect of purchases by less developed from developed regions is surprising. We know from the analysis of the composition of the production structure of these two types of regions that their production structures did differ substantially, and that at the outset of the period of analysis less-developed regions' diversification was substantially inferior than that of developed regions. We expect that as less developed regions diversified, they import-substituted from developed regions and their industrial structure became increasingly similar to that of developed regions. However, it is not obvious why would, in this process, developed regions also import-substitute from less developed regions.

One possible explanation is the following. We expect that the products that less-developed regions replaced with their own production were at higher levels of processing than those they produced at the outset. Then, as less-developed regions import-substituted for goods requiring a higher degree of processing, they drove up the demand for inputs produced in their territories, reducing supply to other regions. This would have forced developed regions to seek other suppliers. Since we do not observe prices, we cannot control for this essentially supply-side effect. Of course, neither can we rule out that, in fact, developed regions did for some reason import-substitute from less developed regions as well. Still, it is noteworthy that the positive effect of complementarity on trade is higher for purchases by less-developed from developed regions in all four specifications even if the difference is not statistically significant.

Table 6.3. Production Structure and Inter-Regional Trade: Equation 6.6[1]

	Industrial Structure			
	Detailed		35-industry classification	
	Euclidean Index I	Krugman Index II	Euclidean Index III	Krugman Index IV
n_i	0.813**	0.913**	0.384	0.590**
	(0.29)	(0.28)	(0.32)	(0.31)
n_j	–0.110	0.004	–0.421*	–0.317
	(0.29)	(0.28)	(0.32)	(0.31)
$SR^dBR^dd_{ij}$	0.324	0.107	0.004	–0.230
	(0.46)	(0.40)	(0.47)	(0.29)
$SR^uBR^dd_{ij}$	0.792*	0.822*	–0.682	–0.328
	(0.46)	(0.40)	(0.57)	(0.41)
$SR^dBR^ud_{ij}$	1.042*	1.116**	–0.213	–0.112
	(0.47)	(0.40)	(0.56)	(0.41)
$SR^uBR^ud_{ij}$	–1.301**	–0.912*	–2.113**	–1.574*
	(0.45)	(0.43)	(0.43)	(0.45)
y_j	0.721**	0.693**	0.713**	0.734**
	(0.08)	(0.08)	(0.08)	(0.08)
p_{mj}	0.208**	0.220**	0.209**	0.173**
	(0.07)	(0.07)	(0.06)	(0.07)
No. observations	280	280	280	280
Degrees of freedom	216	216	216	216
Standard errors	0.190	0.192	0.192	0.197
Residual sum of squares	7.837	7.983	7.918	8.382
Adjusted R^2	0.634	0.627	0.630	0.609
F-statistic	78.0	76.0	76.9	70.9

[1]Standard errors are in parentheses. **, *, and * denote significance of coefficient at 1 percent, 5 percent, and 10 percent level, respectively.

The association between production structure complementarity and trade among less developed regions is negative even when the more detailed specification is used. While the effect is somewhat lower than at higher industrial aggregations, it is still significant at the 1 percent level in specification I (–1.301) and at the 5 percent level in specification II (–0.912). Overall, the estimated effects of pairwise production complementarity on trade strongly suggest that there was little of significance linking production structure and trade flows among developed regions. However, the substantially more marked changes in structure of less developed regions seem to reflect two contradictory tendencies: a strong element of import-substitution, particularly in purchases by less from more developed regions, and the exploitation of opportunities for intra-industry specialization and trade as their production structures became more similar to that of other less developed regions or to the autarkic structure.

The estimated coefficients on income, y_j, in all four specifications are in a close range, from 0.693 to 0.734, similar to that when the detailed industrial structure was used in table 6.2, and significant at the 1 percent level. The estimated coefficients for import prices, p_{mj}, are also in a close range, from 0.173 to 0.208, but they are approximately one standard error larger than the coefficients in table 6.2 and are all significant at the 1 percent level.

For the detailed industrial aggregation, the results on the pairwise complementarities go some way in explaining the lackluster performance of the complementarity with the autarkic structure. Apparently, import-substitution between developed and less developed regions at the detailed industrial aggregation level partially canceled the positive effect that intra-industry division of labor among less developed regions had on increased opportunity

for trade among them. Thus, the negative estimated coefficient on the complementarity with the autarkic structure for less developed regions was only weakly significant. Similarly, import-substitution between developed and less developed regions (weaker when developed regions were in the position of buyer) and the lack of association between the structure of developed regions and trade among them appear to have largely canceled each other out. Thus, we obtain an insignificant effect of the complementarity of developed regions with the autarkic structure on their purchases from other regions.

However, considering that at the 35-industry aggregation in the previous set of estimations we detected a significant negative association between drj and the purchases of developed regions, it is somewhat puzzling that when pairwise complementarities are used we detect no significant negative association either with their purchases from other developed regions, or with their purchases from less-developed regions. Inevitably, we return to the thought that the similarity of production structure with the autarkic structure might be an indicator of other factors potentially related to trade, and not solely a summary measure for the pairwise complementarities.

6.6.3 A "Hybrid" Model

Next, we test for the inclusion of both pairwise complementarities and complementarities with the autarkic production structure in one model, call it for the sake of brevity the "hybrid" model. In preliminary estimations, when the complementarity with the autarkic structure is interacted with dummies for developed/less-developed buyer regions, the results for the two are nearly identical when the 35-industry aggregation is used, and

quite similar when the detailed aggregation is used. Moreover, allowing for d_{η}'s interaction with buyer-region dummies visibly increases the variance of coefficient estimates, suggesting multicollinearity problems. Thus in table 6.4 we present the results of the hybrid model when the complementarity with the autarkic structure is not interacted with development level dummies, but the indices of pairwise complementarity are interacted as in model 6.6.

We here do not discuss in detail the coefficients obtained in the hybrid model, but present some summary observations. The estimated coefficients on complementarity with the autarkic production structure, d_{η}, remain negative and very similar to those obtained with model 6.5, with the exception for specification I, in which the estimated coefficient becomes clearly more negative than in specification I in table 6.2. They remain significant at the 1 or 5 percent level, except in specification II, just as in table 6.2.

As to the pairwise complementarity index, once we control for the effect of d_{η}, its association with bilateral trade becomes higher by about 1 standard error across all flows and specifications other than specification II. (In specification II, the coefficient on d_{η} remains insignificant). In the case of purchases by less-developed from developed regions when pairwise complementarity is measured at the 35-industry aggregation its coefficient reverses sign, becoming negative, but significant at the 10 percent only in specification III. It is also interesting that in this specification the difference between coefficient estimates for *dij* in the case of flows from developed to less developed regions and flows in the reverse direction, becomes somewhat significant for the 35-industry aggregation, but it remains only slightly above one standard error in the case of the detailed aggregation. In all other respects, the

basic pattern of estimated coefficients on pairwise complementarity remains unchanged compared to table 6.3.

We can conclude that, while inclusion of d_{rj} appears to reduce to some extent the negative effect that pairwise complementarity had on bilateral flows, it does not fully control for the effect that pairwise similarities of production structure had on the increased opportunities for trade.

An interesting observation is the interaction between d_{rj} with n_i and p_{mj}. Note that in all specifications the coefficient on n_j declines significantly with the inclusion of d_{rj}, becoming significant in three out of the four specifications. This is in accordance with our earlier discussion about the overlap that exists between n_j and d_{rj}. Similarly, the estimated coefficient

on import prices declines when d_{rj} is included for all specifications except specification II. A possible explanation is that at times when import prices increased regions diversified their production in order to substitute for foreign imports.

6.7 Conclusion

The results from the empirical analysis carried out in this chapter indicate that, although former-Yugoslav regions, particularly the less-developed ones, despecialized considerably over the period of analysis, the despecialization is not singly related to import-substitution in trade among the regions. In particular, the observed pattern of association between measures of despecialization and import-substitution does not support the claim that institutional obstacles to inter-regional trade resulted in import-substitution among them.

Table 6.4. Production Structure and Inter-Regional Trade: Hybrid Model, OLS Estimation Results[1]

	Industrial Structure			
	Detailed classification		35-industry classification	
	Euclidean Index	Krugman Index	Euclidean Index	Krugman Index
	I	II	III	IV
n_i	0.824**	0.922**	0.570*	0.870**
	(0.29)	(0.28)	(0.32)	(0.31)
n_j	–0.504*	–0.022	–0.937**	–0.552*
	(0.34)	(0.28)	(0.34)	(0.30)
d_{ij}	–1.078*	–0.142	–1.865**	–0.755**
	(0.49)	(0.13)	(0.48)	(0.19)
$SR^dBR^dd_{ij}$	0.647*	0.170	0.325	0.060
	(0.48)	(0.40)	(0.46)	(0.29)
$SR^uBR^dd_{ij}$	1.077*	0.880*	–0.746*	–0.290
	(0.48)	(0.40)	(0.55)	(0.40)
$SR^dBR^ud_{ij}$	1.567**	1.236**	0.906*	0.397
	(0.52)	(0.42)	(0.61)	(0.42)
$SR^uBR^ud_{ij}$	–0.872*	–0.800*	–1.338**	–1.041*
	(0.48)	(0.44)	(0.46)	(0.46)
y_j	0.768**	0.683**	0.630**	0.671**
	(0.08)	(0.08)	(0.08)	(0.08)
p_m	0.135*	0.224**	0.159**	0.162**
	(0.08)	(0.07)	(0.06)	(0.06)
No. observations	280	280	280	280
Degrees of freedom	215	215	215	215
Standard error	0.189	0.192	0.185	0.191
Residual sum of squares	7.662	7.942	7.391	7.818
Adjusted R^2	0.640	0.627	0.653	0.633
F-statistic	70.1	66.7	73.7	68.2

[1]Standard errors are in parentheses. **, *, and * denote significance of coefficient at 1 percent, 5 percent, and 10 percent level, respectively.

We identify a complex pattern of association between the observed despecialization and inter-regional trade. There is unambiguous evidence of import-substitution only in

purchases by less-developed from developed regions, and some evidence of import-substitution in flows in the reverse direction: from less-developed to developed regions. Also, the results show an unambiguous evidence of a positive association between increased similarity in production structures among less developed regions and trade among them. Since there is no reason why institutional barriers would have spared any particular set of regions, the latter observation is the most powerful evidence against the claim that institutional factors forced import-substitution among the regions. Finally, the results also show that increased similarity of production structure with the autarkic production structure had a positive effect on purchases from other regions both for developed and less developed regions. This suggests that there might have been an additional, trade creating effect of despecialization, possibly related to technological characteristics or consumption characteristics, proxied by the similarity to the autarkic production structure.

Our results do not rule out the possibility that former Yugoslav regions were more diversified than would have been optimal. For example, the observed import-substitution by less developed from developed regions might have been excessive. It may well be that policy makers' preconceptions on the production structure that is "ideal" for development, or the country-wide market signals distorted by misguided regulatory intervention that encouraged the same pattern of misallocation in all the regions, resulted in more similar production structures than would have been optimal. However, our results seem to suggest that institutional obstacles to inter-regional trade were not significant enough to prevent enterprises from exploiting opportunities for cost-saving intra-industry division of labor between the regions.

CHAPTER SEVEN

CONCLUSIONS

In this study we set to explore the claim often heard in the public of former Yugoslavia that the politico-economic institutions of the 1970s and 1980s increasingly led to regional economic disintegration. We measure integration with the extent of inter-regional trade and assume that it overwhelmingly depends on the evolution of the complementarity of regional production structures. We identify the factors that might affect regional specialization, but we also underline the fact that there is a fair degree of indeterminacy as to the optimal level of production specialization among a group of regions. The indeterminacy leaves room for substantial variation in the extent of specialization that might result within different economies, under the influence of chance and incidental factors. Moreover, given any level of inter-industry specialization, there is ample room for variation in the extent of intra-industry specialization. Therefore, even when regional production structures are relatively diversified at the observed-industry level, inter-regional trade might be high owing to intra-industry specialization.

In our analysis of the politico-economic system we suggest that micro-economic agents in former Yugoslavia had more autonomy and might have been under stronger

influence of market forces in their day-to-day decision making than is often recognized. We point to the probability that, to the extent that market forces were present, they had an integrative effect on the evolution of the economy. However, we also point to several channels through which the institutions peculiar to former Yugoslavia might have imposed obstacles to inter-territory trade—both between localities, and between regions. We conjecture that an important channel of disintegration might have been the territorialization of investment decision making in conjunction with the fact that enterprise exit was systematically avoided and rare. A combination of market and non-market factors, including market signals distorted by regulatory intervention, might have led to capacity duplication which was thereafter not eliminated through the usual process of enterprise exit under competitive pressure. The territorialization of decision making would have insured that such duplication happened across as opposed to within political territorial units.

We conjecture that other channels of disintegration might also have been present, such as the simple fact that communication and institutional links were closer among agents within, than across, a political territorial-unit. While there were institutional barriers to interaction across communal as well as across regional borders, the barriers at the communal level were more easily overcome as agents could rely on powerful (although informal) regional-level channels or arbiters to do so. There were no similar institutions at the Federal level to assist in the overcoming of regional borders. In the event, whether these disintegrative factors left a significant imprint on economic structures or not, is an empirical question.

Our empirical analysis finds that there was indeed a bias for intra-regional trade associated with the process of capital formation, but does not identify any other significant channel of disintegration. An increase in the supply capacity of a region, measured through an increase in its capital, was unambiguously associated with a larger increase in intra- than inter-regional trade. Interestingly, such a bias cannot be detected on the demand side—an increase in disposable income of a region seems to have affected its demand for intra- and inter-regional flows indiscriminately. This latter finding is qualified by the possibility that our econometric methods might not completely remove the effect of measurement error, overstating the effect of income on inter-regional trade. Still, it is compelling to remember that demand was largely the result of the day-to-day decision making process of economic agents—decisions strongly under the influence of market forces—while supply was more closely linked to the investment process which, in turn, was quite heavily affected by policy-makers and non-market institutions.

None of the other factors determining regional trade—import prices, labor supply, and, most interestingly a trend capturing any other residual effects—seem to have had a significantly different effect on inter-and intra-regional trade either. We interpret this finding to mean that most of the potential channels of disintegration identified in the institutional analysis were either absent or, at least, did not increase in intensity over the period of analysis. In particular, a hypothesized perceived risk premium attached to transactions across regional borders, if present, did not increase over the period of analysis.

The question remains as to how exactly did the capital accumulation process bias regional trade. We explore the possibility that investment structures were aimed at

substituting away from inter-regional purchases, by testing the relationship between regional specialization and inter-regional trade. Regional production structures did grow increasingly similar in the period of analysis for all regions except for the group of developed regions in relation to one another. However, we find ambiguity in the association between production structure similarity and trade flows. On the one hand, there is an unambiguous negative association between industrial similarity and purchases by under-developed from developed regions. On the other hand, there is a strong positive association between similarity of production structure and trade among less-developed regions. Also, we find a generalized positive association between similarity in regional production structures with that of the ROC for both developed and less-developed regions. Finally, the evidence regarding developed regions' purchases from less-developed ones is mixed.

In general, there is no support for the view that the observed increasing similarity of regional production structures was driven by institutionally motivated import-substitution of regions from one another. Rather, the evidence suggests that import-substitution did accompany the development process, but that increasing similarity of production structures and industrial diversification was accompanied by intra-industry specialization and growing levels of trade as well.

Therefore, the reasons for the bias towards intra-regional trade associated with capital accumulation that we identified in Chapter V has to be sought elsewhere. A likely possibility is simply that the decision-making structure resulted in investment decisions more closely matched to the supply needs within the region than across regions. For example, it is well documented that former-Yugoslav enterprises tended to be large, to

continuously diversify, and to often direct their investment to the increasing coverage of the stages of a product's production. As flows among enterprise units, BOALs, are observed in our data, and as BOALs within an enterprise tended to be located within the same region, such enterprise behavior would have resulted in the bias we observe in Chapter Five even if enterprises did not discriminate between buyers/suppliers from their own and other regions. Interestingly, the very high association between the number of industries present in a region and the level of the region's inter-regional sales suggests the possibility that enterprises sought markets across regional borders particularly to reduce per unit costs of production once new facilities were in place.

However, our results do not rule out the possibility that the development process in former Yugoslavia was less integrative than it might have been in a different institutional environment. The fact that the similarity in production structures with that of the ROC grew very fast for all less-developed regions, and the fact that this evolution was unambiguously associated with import substitution with respect to developed regions, suggests that there might have been a bias in the selected investment structure towards the creation of "balanced" industrial structures in all regions.

This possibility is also supported by the pattern of evolution of the production structures of the developed regions showing clear convergence in the period 1952-1970, resulting in the increasing resemblance of the region's production structures to that of the national economy overall. We cannot explore the nature of the association between those structural changes and inter-regional trade, but we might conjecture that institutional factors even before the period of our analysis emphasized diversification and "balanced" industrial

development against regional specialization. This "balanced" pattern of development may have been the result of policy-makers' bias as to what are optimal patterns of development, but we find it more likely to have been the result of the described combination of nation-wide distortions in signals and prices and territorialization of investment decision making.

While capacity duplication might have happened, it is noteworthy that the identified positive overall association between industrial structure similarity and inter-regional trade suggests that, once the capacities were in place, market agents sought to reap the benefits from intra-industry specialization through inter-regional trade. The apparent homogeneity of the effect of all factors other than capital on intra- and inter-regional trade also suggests that market agents did not discriminate between inter- and intra-regional trade.

In sum, the evidence does show increasing economic disintegration only in the sense that capital investment contributed more to intra-regional than inter-regional trade. A development pattern creating "balanced" regional production structures contributed to the disintegration. However, there is no evidence of a generalized tendency among regions to import-substitute against one another. Moreover, market forces appear to have had a strong counterbalancing integrative effect. We find that the openness of the Yugoslav regions resembled that of small countries, and we also find segmentation along regional lines. In the end, the extent of economic integration attained by the former Yugoslav regions appears to have been particularly unfortunate. It was high enough to render political disintegration very costly. However, it was not high enough to render it unthinkable.

APPENDIX I THE REGIONS

Six republics—Bosnia-Herzegovina, Montenegro, Croatia, Macedonia, Slovenia and Serbia—constituted the Yugoslav Federation, 1945–1991. Serbia had two autonomous provinces, Kosovo and Vojvodina, whose status within the Federation to all practical purposes had become indistinguishable from that of a Republic. Serbia proper, the region of Serbia without the two provinces, had no constitutional identity and no separate government structure. Nonetheless, the three regions of Serbia had distinct economic characteristics. For these reasons, the regions of this study are Serbia proper, Kosovo, Vojvodina and the other five Republics.

Table AI.1 gives basic economic data for former Yugoslavia and its constituent regions in 1987, the last year of our analysis. A striking feature of the regions is their diversity in size and economic development. Serbia proper was the largest, with six million inhabitants, while the smallest was Montenegro, with 625 thousands inhabitants. Economic size was also notably uneven: Croatia, the largest region accounted for 25 percent of the national GMP,[57] while Montenegro accounted for only 1.8 percent, and the next smallest, Kosovo, accounted for only 2.2 percent.

[57]GMP, Gross Material Product, is the Marxist measure of national product and excludes most services. In the Yugoslavia of the 1970's and 1980's, it was about 12 percent less than GDP. See Appendix III.

Table AI.1. Regions of Former Yugoslavia
Basic Data—1987

Region	Territory (sq. Km.) Total	%	Population (thousands) Total	%	GMP (billion dinars) Total	%	GMP/ cap %	Personal con/cap %
Yugoslavia	344,164	100.0	23,411	100.0	49,145	100.0	100.0	100.0
Bosnia-Herze.	51,129	20.0	4,398	18.8	6,420	13.1	69.5	74.9
Montenegro	13,812	5.4	625	2.7	895	1.8	68.2	67.0
Croatia	56,532	22.1	4,672	20.0	12,468	25.4	127.1	114.9
Macedonia	25,712	10.1	2,065	8.8	2,682	5.5	61.9	62.1
Slovenia	20,251	7.9	1,937	8.3	9,436	19.2	232.1	196.6
Serbia	88,361	34.9	9,714	41.5	17,243	35.1	84.6	92.1
Serbia proper	55,968	21.9	5,816	24.8	10,944	22.3	89.6	95.6
Kosovo	10,887	4.2	1,848	7.9	1,078	2.2	27.8	38.1
Vojvodina	21,506	8.4	2,050	8.8	5,221	10.6	121.3	125.2

Source: SGJ 1988.

Even more striking was their disparity in economic development. In 1987, Slovenia's GMP was eight times larger than that of Kosovo. However, both these regions were outliers. Croatia's GMP per capita, the next largest, was only twice as large as that of Macedonia, the next lowest. Disparities in regional development had been large at the time of Yugoslavia's formation and remained so in the interwar period. In the years after World War II, up through the period of this study, the gap between the more- and less-developed regions widened significantly in terms of GMP per capita: the ratio for Slovenia and Kosovo doubled. The regional shares in the physical product of the country remained remarkably stable, but population growth varied widely. In the 1955-88 period population increased by less than

25 percent in the more developed regions and by around 50 percent in the less developed; in Kosovo it more than doubled.[58]

Regions classified as less-developed were entitled to special assistance from the Federation and other regions. Throughout most of the post-World War II period and throughout the period of our analysis, four regions were officially classified as less-developed: Bosnia-Herzegovina, Montenegro, Macedonia and Kosovo. We adopt this classification in this study.

Regional average wages in the socialized sector show less disparity than GMPs per capita. With the exception of Slovenia, they fall within the 69 percent and 107 percent range of the former-Yugoslav average. Slovenian wages stand out and average 50 percent more than wages in Croatia, the next highest. Differences in the value of net industrial product per employee were even narrower with, Slovenia producing 127 percent of the former-Yugoslav average and Kosovo 74 percent. Therefore, regional differences in GMP per capita appear to owe more to the proportional differences in population employed in the socialized sector than to income creation.

Inter-regional regional transfers in former Yugoslavia were high, but with the exception of commercial bank credit they were mostly forced, either through fiscal and para-fiscal mechanisms or through the regional distribution of seignorage resulting from the

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[58]Unless otherwise stated, sources in this section are the annual Statistical Yearbook of Yugoslavia, published by the Federal Bureau of Statistics (FBS) and inter-regional trade data obtained from the FBS. The trade data are discussed in the next section, and our references to the Statistical Yearbook will be with the Serbo-Croatian acronomym, SGJ, with the year to which the reference refers.

regional allocation of central bank credit.[59] From the early 1970's, the most important fiscal transfers were those through the Federal Fund for Accelerated Development of Less-developed Republics (FAD) and grants-in-aid from the federal budget to the budgets of less-developed regions.Together these transfers and subsidies represented an annual total of around 3 percent of donor GMPs or 10 percent of recipient GMPs (more than 30 percent in the case of Kosovo). Other regional fiscal transfers also occurred within the framework of federal subsidies to specific activities such as exports and fertilizer production.

[59]Central bank credit was the primary instrument of money creation.

APPENDIX II THE SYSTEM OF ASSOCIATED LABOUR

Under the system of associated labour, the earlier role of basic market agent held by the enterprise was given to the "work organization of associated labour" (work organization, or WO, for short).[60] The large size of Yugoslav enterprises in the 1960's had been an obstacle on the establishment of labour-management relations as conceived by the system's ideologues. Consider that, in 1971, the social sector of Yugoslavia employed 3.27 million people, and produced a gross value added of about US$10-11 billion, and did so with only 11,101 enterprises (SGJ 1972). The average enterprise, therefore, had nearly 300 employees. It is not surprising that most decisions appeared to be taken far from the shop floor. To bring the decision-making process closer to the rank-and-file of enterprise employees, sub-enterprise levels of decision making had been gradually developing throughout the 1960's. The process culminated in the 1971 Constitutional Amendments. The basic labour-management rights were to be exercised at the lowest organizational level at which the technological process allowed product valuation.

When the size requirement was met, the basic unit of associated labour could be a WO. The larger work organizations were subdivided into Basic Organizations of Associated Labour (BOAL). Strictly speaking, a BOAL was the basic unit of associated labour only in what, with some exceptions, corresponded to the Marxist concept of the 'productive

[60]For a detailed description of the enterprise after 1976, see Prasnikar and Svejnar (1987).

economy'. However, every employee in the social sector was covered by some variation of the associated-labour concept.

The exercise of all the basic labour-management rights was guaranteed at the BOAL level, and few could actually be passed to the WO. These basic rights included decision making on income distribution, on association with or separation from other BOALs, and on production and investment plans within the framework of social planning. Once a BOAL was created, through separation within a WO or as a new venture, the employees of the BOAL were automatically vested with full labour-management rights, including the rights to leave the parent company, to change the BOAL line of production or to impeach management. Some aspects of these decisions required the agreement of other BOALs. BOALs had well-identified profits and losses and paid taxes, since the exercise of their rights was impossible without full-fledged accounting.[61]

The obligatory, organizational and decision-making details among associated BOALs were agreed to in a legally binding 'self-management agreement' (*samoupravni sporazum*) to which the BOALs were signatories. The obligatory relationship among the BOALs of a WO could vary much as they do among a corporation's owners in a capitalist economy. Moreover, a WO could enter into association with other WOs. When they did, a Complex Organizations of Associated Labour (COAL) was formed, similar to holding companies. Finally, a crucial innovation of the system of 1974 was social planning, which replaced the more conventional indicative planning of the late 1960's with a 'multilateral and polycentric

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[61]BOALs were not typically market agents, and, when they were not, output pricing was done at internal, transfer prices. However, the division was real: BOALs could and did sometimes chose to do business with other work organizations at the expense of the BOALs with whom they were associated in a work organization.

bargaining process' (E. Comisso, 1980). Each year, every BOAL and other economic organization, SIC, and SPC adopted a plan specifying, among other, envisaged activities, projected results, sources of financing, and planned income distribution. The plan had to be in harmony horizontally, among the BOALs in a WO and with basic providers of social services, and vertically, up the ladders of economic association—BOALs, WOs and COALs—, and up the ladder of SPCs, from commune to Federation. Harmonization began with the adoption prior to the planning process of self-management agreements among economic agents, and social compacts (*društveni dogovor*) among SPCs and within SPCs. The self-management agreements and social compacts incorporated environment projections, broad plan objectives, and the more important commitments assumed by the signatories. Social plans focussed especially on investment allocation and income policy. In the late 70's and early 80's, a partially successful political effort was made to replace market regulation with contractual obligations in the areas of price determination, association of commercial and production organizations, and the distribution of foreign exchange proceeds. Where contractual obligations had been introduced, the plans reflected them.

APPENDIX III THE DATA

AIII.1 Gross Material Product, GMP

The methodology of Yugoslav (1945–1991) economic statistics was based on the Marxist definition of product. This is reflected in both the national accounts concepts used in this study and the coverage of the regional sales data. The central concept of national accounts was gross material product (GMP), the value (at market prices) of all material production, utilities, and 'productive' services. Productive services included trade, transportation, catering and hotels, repairs and most crafts. Science, education, health care, government and banking were not considered productive services, and their output was not included in the GMP, their earnings were not included in the concept of disposable income, and their sales were not included in the regional trade data. Based on available national accounts statistics, the Yugoslav GDP in the period of analysis was approximately 13 percent higher than the GMP.[62]

We do not expect the exclusion of the above-cited economic activities to have had a significant effect on our conclusions. First, these sectors produce hard-to-trade goods, and their exclusion would not strongly affect the measurements of inter-regional trade flows. Second, in the case of former Yugoslavia, most of the excluded activities were provided as

[62]IBRD (1975) estimates the difference to have been 14 percent for the period up to 1970.

public goods, and market interaction was irrelevant to their financing and provision. The only significant exception was financial services.

The Yugoslav Federal Bureau of Statistics (FBS) published[63] both domestic[64] and national[65] GMPs for each of the regions. The difference between the two is small, but was largest for Montenegro: in 1987, its domestic product was 4.7 percent larger than its national product. For every other region in any given year, the difference was less than 4 percent. We adopt the domestic principle for the measurement of product.

AIII.2 Regional Trade, X_{ii} and X_{ij}

The data on regional sales in Yugoslavia are taken from a wider FBS survey made in conjunction with the regional bureaux.[66] The survey was conducted biennially from 1962-1980 and in 1983 and 1987, and its purpose was to collect the information necessary for national input-output tables. However, the data for before 1970 appear to have been lost. The survey's coverage was extremely detailed, including virtually the entire population of social sector firms, but it did not include privately owned firms. The data cannot be directly compared to international-trade measures of merchandise exports for several reasons: merchandise sold by the private sector was not covered; some services were included; cross-hauling, particularly of imported goods, was not excluded; sales by trade intermediaries were

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[63] See *Bilteni 'Društveni Proizvod'* and the annual, *Statistički Godišnjak Jugoslavije* (SGJ).

[64] *"po principu cistih delatnosti"*

[65] *"po organizacionom principu"*

[66] FBS Survey PB-11

included, allowing the possiblity of double counting, especially in intra-regional trade. Other coverage problems pertaining to the trade flows stem from organizational changes in the Yugoslav economy.

AIII.2.1 Problems of Coverage

A rough estimate of the overall discrepancy can be made between inter-regional sales, as recorded by the data, and what, in principle, would be considered exports from one region to another on the basis of a 1986 FBS statistical monograph (D. Miljković, 1986). The monograph gives inter-regional sales and purchases cleaned of double-counting and cross-hauling, as the share of regional gross outputs for 1976 and 1980.[67] Assuming that Miljković used the same figures for gross social output as those published in SGJ, 1980, the regional sales, when netted turn out to be as follows: for Serbia proper, 21 percent, for Macedonia 16 percent, for Montenegro -3 percent, and, for all the other regions, between 10 and 14 percent less than the gross sales we use in this study. The potential sources of discrepancies are discussed below, and the organizational changes in the economy that prompted Miljković to use gross social output as his denominator are discussed in section AIII2.2.

The FBS survey observed purchases as well as sales. However, the FBS was willing to release only aggregate sales data, by regional origin and destination, that is, the sum of sales reported by destination by all the enterprises in a region. Regional purchases in this study are, therefore, the converse of sales. This is important to note because the survey did

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[67]Gross social output is the total value of 'productive sector' production. It is the sum of value added and material costs of production.

not cover inter-regional sales by the private sector. However, purchases from the private sector are likely to have been local or, in large part, through social-sector firms. The social-sector firms would subsequently have been the sellers across regional boundaries, and these sales would have been captured by the survey.

The inclusion of inter-regional sales reported by trade firms, including foreign-trade firms, would have resulted in cross-hauling. Sales reported by foreign-trade firms would have largely consisted of foreign imports, where the foreign trade firm appears only as an intermediary. This inflated the sales, especially, of regions with big foreign trade firms (Serbia proper and Slovenia), and the estimated purchases of regions (mostly Kosovo, Vojvodina and Montenegro) where imports tended to be through intermediaries in other regions. Cross-hauling of imported goods is a consideration of particular importance because it could result in a spurious correlation between imports and regional trade. This problem, however, does not apply to exports, because direct sales to foreign-trade firms of goods intended for exports were excluded from the data.

We construct an illustrative estimate of import cross-hauling based on an unpublished FBS matrix of regional import intermediation in 1988. Only 20 percent of total regional imports was through intermediaries located in a different region. Intermediation by Serbia proper accounted for one-half of that 20 percent, by Slovenia, for 19 percent, and by Croatia, for 13 percent. The higher percentage of intermediation by Serbia proper appears to be a legacy of the late 1960's when it 'inherited' several large, previously federal foreign-trade

Table AIII.1 The Data: Yugoslavia, 1970–1987
Estimated Share[1] of Imports in Regional Purchases

	Bosnia-Herzeg.	Monte-negro	Croatia	Mace-donia	Slovenia	Serbia proper	Kosovo	Vojvo-dina
1970	7.1	5.2	5.4	6.4	5.3	3.3	5.0	10.3
1972	5.3	3.5	5	4.2	4.3	3	4.8	8.7
1974	7.0	5.2	7.5	5.5	5.8	3.2	8.9	15.3
1976	7.4	4.7	5.5	4.9	3.4	2.9	7.4	9.6
1978	6.7	6.7	5.4	5.1	3.2	2.7	9.2	9.9
1980	10.0	6.4	7.3	6.3	4.0	3.2	15.5	17.5
1983	10.2	4.8	5.9	8	4.5	3.5	12.2	15.6
1987	7.9	4.7	5.2	7.6	4.7	3.1	8.5	17.8

[1]In percentages.

firms.[68] In addition, Kosovo and Vojvodina imported overwhelmingly through these Belgrade firms. If Serbia proper's intermediation in the early 1970's was at the level we observe in the late 1980's, it would not lend support to allegations at the time of Serbian dominance of foreign trade. A closer look at D. Miljković (1986) and the trade intermediation matrix suggests a decline did occur in Serbia proper's intermediation between 1976 and 1988, but it is hard to judge whether or not Serbia's dominance in the early part of the decade might have been overwhelming.

Table AIII.1 gives our estimates of the share of import cross-hauling in total regional purchases. The shares were obtained by applying the 1988 matrix to the imports of each

[68] See Chapter Two.

region in the years of our analysis, and dividing by the region's purchases in the corresponding year.

Cross-hauling unrelated to foreign trade or double counting because of the domestic multilateral barter deals frequently used to settle regional accounts in bilateral clearing trade may also be present in the data. The multilateral deals would add to the spurious positive correlation between imports and interregional trade flows. There are no data on the basis of which to estimate the likely magnitudes of either presence.

AIII.2.2 Modifications in the Statistical Base

The processes of enterprise divisionalization, described in Chapter Two, gained momentum in 1974. By 1976, the year in which transformation in line with the Law on Associated Labour (LAL) became compulsory and the first year for which exact figures on the new organizational structure of the economy were collected, 8,617 of Yugoslavia's 9,682 enterprises had become WOs and 2,520 of these had been divided into a total of 13,997 BOALs (Ilija Todorovic, 1987). The number of BOAL subdivisions continued to grow until 1982 or 1983 (the numbers are available only for the even years), when their number peaked at 17,067; it subsequently declined to 13,189 in 1987.

Survey PB-11 was addressed to the lowest organizational form of an enterprise. This means that if an enterprise had become subdivided into two or more BOALs, what previously would have been internal deliveries became recorded as sales of the individual BOALs. Given that only a very small proportion of enterprises were multi-regional, the reorganization inevitably inflated intra-regional sales.

The accounting procedures changed many times in the years of our interest, but a look at the share of 'Sales to Other OALs Within a WO' in the total-sales figures collected by the Social Accountancy Service (SAS)[69] gives an idea of the dimensions of the externalization of previously internal flows.[70] These percentages for the years available are given in column 2 of Table AIII.2. The share of internal sales in total recorded sales increased from about 5 percent in 1970 to almost 25 percent in 1983; it declined somewhat in 1987. Unfortunately, a straightforward subtraction of internal sales from total sales could not provide us with a comparable series of intra- and inter- regional flows because of the complexities of the reorganization. Aside from divisionalization, there was also integration, of associating BOALs, which likewise inflated SAS-recorded internal sales, and there were spinoffs of BOALs into independent WOs, which reduced recorded sales.[71]

One of the effects on recorded economic flows of the ongoing reorganization can be seen in the changing ratio of recorded intermediate costs to GMP. As internal transfer prices within a WO were not recorded by the statistics as cost, changes in the ratio of statistically recorded input costs to value added for a product, assuming constant technology and relative

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[69]Unpublished tables, various years.

[70]In some years, the account is called 'Sales to Other Organizations Within an Organization of Associated Labour.' I have not been able to find out whether the difference in names has any substantial implications.

[71]Political pressure was applied not only for the formation of BOALs within WOs but also for association into higher level OALs. A former enterprise could wind up: (a) a WO without BOALs; (b) a WO with BOALs; (c) several new WOs—some with, some without BOALs; (d) divided into BOALs which in turn integrated with WOALs or BOALS derived from other former enterprises. And WOs could associate into COALs. Real entry and exit were small: in the whole 1976–1986 period, 1366 new WOs entered the market, while 808 BOALs and 479 WOs without BOALs were liquidated. The net effects of these reorganizations on the overall industrial structure can be appreciated from the table below.

Table AIII.2 The Data: Yugoslavia, 1970–1987
Enterprise Reorganization–Effect on Sales

Year	Internal sales % total sales	Intermediate costs %GMP	Intra-regional sales %GMP	Real intra-regional sales
1970	4.2	121.1	163.2	100.0
1972	...	122.3	170.6	117.8
1974	14.3	140.0	199.9	157.1
1976	18.2	139.7	199.1	168.6
1978	...	132.8	206.0	201.4
1980	24.8	140.4	217.4	232.7
1983	23.9	146.9	229.1	247.5
1987	23.9	119.7	180.0	204.1

prices of the product, reflect in full changes in vertical integration. The ratio of aggregate material costs to GMP of the social sector are given in column 3 of Table AIII.2. The ratio increases by over twenty percentage points, peaking in 1983, and falls, in 1987, back to its 1970 level.

The intensity and direction of the changes are in clear correlation with the index of aggregate, real intra-regional sales. Recorded inter-regional flows would be affected by industrial reorganization only to the extent enterprises operating in more than one region were divided into units located in different regions. In 1976, only 3 percent of BOALs were located outside the region of residence of the parent WO, and the percentage had fallen to around 2 percent in 1987. Subdivisions in a small part of the economy would not have had a significant effect on inter-regional flows.

No other sources appear to be available for an independent assessment of the PB-II Survey sales figures as indicators of regional trade. The Institute for Transports and Communication in Belgrade did two surveys of commodity flows for Serbia in the mid- and late 1980's, but, in both, PB-11 data were the reference.

AIII.3 Production Structure, D_{ij} and D_{jr}

The measurement of regional production-structure similarity was based on structure of production in manufacturing and extractive industries. Two classifications were used: a two-digit disaggregation into 35 commodity groups, and a detailed disaggregation into approximately 650 commodity groups.[72] Industrial output is measured in terms of value added in constant 1972 prices.

Every three years, the FBS thoroughly revised and expanded its detailed industrial classification of goods. The detailed list grew from 681 industries in 1970 to 2665 industries in 1987. The classification revisions had not been carried out systematically, and we brought them to compatibility manually by re-aggregating to the aggregate structure of 1970. To re-aggregate, we used the weights used by the FBS for its industrial real-growth indices. These weights are not published and only those for 1970, 1975, and most of the years after 1982, could be found. We were, therefore, able to obtain detailed industrial-similarity measurements for only 1970, 1975, 1983 and 1987.

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[72]A series of growth indices of regional GMP in constant 1972 prices disaggregated into 45 industrial groups was composed from a series of annual FBS Bulletins *Drustveni Proizvod*. The detailed regional industrial production structure was published in the annual FBS bulletin, *Industrija* and *Industrijska Proizvodnja*.

Many factors, among them, weight availability, the unknowns with regard to the contents of some industrial groups, and industry name changes not necessarily accompanied by change in contents, limited the precision of industrial structure compatibilization. In the event, we obtained 681 industries for 1970, and 627 industries for 1975. For 1983, we developed two classifications—one with 659 and the other with 862 industries—and for 1987, our final aggregation has 881 industries.

The two 1983 classifications were for use as the bridge between the close-to-incompatible classifications of the early 1970's and of 1987. Denoting with $D_{ij,83}$ the industrial complementarity measurement between regions i and j made with the 1983, 659-industry classification, with $D_{ij,83}^{*}$, that made with the 1983, 862-industry classification, and with $D_{ij,87}^{*}$, that made with the 1987, 881-industry classification, then the similarity measurement for 1987 used in our excercise is obtained as $D_{ij,87} = D_{ij,83} \cdot D_{ij,87}^{*} / D_{ij,83}^{*}$. Sensitivity tests showed that the measurement of industrial similarity is quite insensitive to the random exclusion/inclusion of 50 industries. Moreover, $D_{ij,83}^{*} - D_{ij,83}$ is of an order of magnitude smaller than $D_{ij,83} - D_{ij,75}$. Thus, while the less-than-complete compatibility of industrial classifications introduced additional noise into the analysis, it is unlikely that it biased the results of the estimations.

AIII.4. Number of Industries, N_t

Denote with Nn_t the number of industries in a given year's detailed classification: $Nn_{70} = 681$, $Nn_{75} = 627$, $Nn_{83} = 659$, $Nn_{83}^{*} = 862$ and $Nn_{87} = 881$. Denote with Nn_{it} the number of industries present in a given region in a given year; the variable N*it* "number of

industries in regions'" used in Chapter Four is $N_{it} = Nn_{it} / Nn_t$. Only the detailed industrial classification was used since at the two-digit aggregation level, all the industries, with the exception of a few extractive industries, are present in all the regions throughout the whole period of observation. For 1987, the ratio was extrapolated, as in the case of the similarity measurement: $N_{i,87} = N_{i,83} N_{i,87} / N_{i,83}^*$. The values of the variable thus obtained are shown in table AIII.3.

AIII.5. Deflators

Producer price indices by region, or any price indices by product group by region, were not public information in former Yugoslavia. Thus, implicit regional GMP deflators were used to deflate all current price values other than those related to foreign trade. The FBS computes regional GMPs in constant 1972 prices on the basis of detailed estimates of physical production indices.

The former-Yugoslav accounting methodology led to GMP overestimation in current prices under conditions of inflation. This bias increased with the increasing inflation during the period of observation. Since GMP in constant prices seems to have been relatively reliable, the implicit GMP deflator was likely to have overestimated inflation. In 1987, when annual inflation reached three digits, the bias may have been as much as five percent of real GMP.[73]

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[73]Oral communication by experts in the Slovenian Bureau of Statistics, 1991.

Table AIII.3 The Data: Yugoslavia, 1970–1987
Ratios of Industries per Region to Total Industries

	Bosnia-Herz.	Croatia	Maced-onia	Monte-negro	Slovenia	Serbia proper	Kosovo	Vojvo-dina	Total Industries
1970	0.496	0.708	0.379	0.211	0.717	0.665	0.211	0.441	681
1975	0.529	0.719	0.416	0.193	0.719	0.671	0.222	0.45	627
1983	0.598	0.75	0.476	0.206	0.754	0.715	0.266	0.478	659/862
1987	0.616	0.751	0.506	0.242	0.771	0.749	0.274	0.494	881

AIII.6 Foreign Trade, Mc, Mh, Eh

The foreign-trade data are unpublished and obtained directly from the FBS. They cover only merchandise imports and exports. Regional exports/imports are defined on the basis of regional origin or region of use of the commodity in question irrespective of the location of the firm that did the actual export/import transaction.

FBS does not show the breakdown of trade with regard to the areas of clearing and hard-currency areas. We estimate these two categories as follows. The series on trade with clearing areas is composed as the sum of exports/imports to/from the USSR, Czechoslovakia and the German Democratic Republic. These three countries maintained continuous bilateral clearing accounts with Yugoslavia and comprised at least three quarters of all Yugoslav foreign trade with bilateral clearing payments. Bilateral clearing arrangements with other East European countries and with some developing countries were not maintained throughout the period of analysis; most were replaced by hard currency payment at some point in the period of our analysis. Trade with the area of hard currency payment was estimated as the difference between total export/imports and exports/imports to/from clearing areas.

The dollar values of the two types of export/import flows was deflated as follows. The FBS compiled unit value indices for Yugoslav exports/imports disaggregated by commodity group, not by foreign-trade area or Yugoslav region. Moreover, the FBS was willing to let us have only the commodity composition of total regional exports/imports, not by area of trade. Therefore, a chained deflator had to composed for each region on the basis of the annual commodity composition of its exports/imports (aggregated into the nine, one-digit, SITC commodity groups) and the unit value indices of the respective commodity groups for total Yugoslav exports/imports. This regional deflator is applied both to a region's hard currency and clearing exports/imports.

Domestic costs for the foreign trade flows was obtained, up to 1983, by multiplying the statistical dollar value of the flows by the statistical dinar/dollar exchange rate. From 1983 on, both the dollar values and the dinar values are computed with the exchange rate[74] current when the transaction took place.

AIII.7 Employment, L

The measurement of employment is annual average employment in the 'productive' sector of the economy, as published in the SGJ.

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[74]There is no significant discrepancy between the statistical and market exchange rate up until 1983. In 1983 the FBS began computing foreign trade series in current market exchange rates for their own use, but most of its publications (notably, the SGJ) continued applying the statistical rate, which in 1983 becomes very misleading.

APPENDIX IV EXPORT PRICES AND HARD-CURRENCY EXPORTS

We do not observe the export price variable, world export prices multiplied by the shadow price of foreign exchange, $P_e^w P_f$, that we conjecture might be a factor in the determination of regional trade flows. Instead, we observe the multiple of the world export price and the official exchange rate, $P_{ie} = P_e^w NEX$. As discussed in Chapter Four, it could be that $P_e^w P_f$ was not a determinant of regional trade if exports were largely determined by the need to employ excess capacity. Or, even if $P_e^w P_f$ was relevant, it could be that the negative effect of P_e^w on P_f was so strong that using P_{ie} as a proxy would give weak results. A first requirement, however, for P_{ie} to be relevant to domestic trade is that we should be able to detect a significant positive association between P_{ie} and hard currency exports, Eh_i.

We therefore run several OLS regressions, with all the variables specified as mean-deviations of the logarithms of the original variable, as in the main system. First, we conjecture that Eh_i ought to be determined by the availability of supply factors, export prices and possibly a trend. We specifiy the regression as a panel, in mean-deviation form, of the logarithms of the original variables. The estimated relationship is as follows:

$$(AIV.1) \quad eh_{i,t} = \underset{(0.24)}{-0.446\, k_{i,t}} + \underset{(0.35)}{1.279\, l_{i,t}} - \underset{(0.08)}{0.397\, p_{ie,t}} + \underset{(0.01)}{0.018\, trd} \qquad R^2 = 0.54 \text{ and } F\text{-stat} = 63.5$$

where standard errors are given in parenthesis, and lowercase letters denote the mean-deviation of the logarithm of the variable with uppercase names.

The estimated effect of export prices on exports is in fact negative and significant at the 1 percent level. The estimated effect of labor is positive and significant at the 1 percent level, but the effect of capital is negative, contrary to our expectations and significant at the 5 but not 1 percent level. Finally, the trend is positive but not highly significant.

Since it is possible that the estimated negative effect of export prices is in fact the negative effect of an increase in p_f caused by an increase in p_{ie}^w, we conduct a second estimation where we include import prices as a proxy for p_f. Because variations in import prices, particularly of petroleum, are likely to have had a substantially more powerful effect on p_f than variations in export prices, we expect that p_{mi} will pick up any effect of p_f on exports, leaving in the estimated coefficient on p_{ie} solely the effect of export earnings. The estimated relationship is as follows:

(AIV.2) $eh_{it} = -0.449\text{ki} + 1.279\, l_{it} - 0.502\, p_{iet} + 0.107\, p_{mi} + 0.017 trd$ $R^2 = 0.54$ and
(0.24) (0.35) (0.23) (0.22) (0.01) F-stat = 47.5

Once again, standard errors are in parentheses.

The coefficients of all variables other than pie change marginally. The coefficient of export prices increases in absolute terms, but so does its standard error, which nearly doubles relative to (AIV.1), probably because of the high correlation with p_{mi}. The inclusion of p_{mi} has a significant effect on the estimated coefficient of p_{ie}, but, contrary to expectations, the latter becomes more negative than before. Import prices have a positive effect, suggesting that this variable is capturing the effect of the shadow price of foreign exchange. In sum, export prices were not exogenous, but instead responded to fluctuations in export levels.

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