THE LEONTIEF PARADOX IN FOREIGN TRADE OF A SOCIALIST COUNTRY: SOME EMPIRICAL EVIDENCE RECONSIDERED

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A B S T R A C T

The aim of this paper is to search for the determining factors of the interindustrial trade pattern of a small open socialist economy controlled by a plan. In the empirical study, based on input-output tables for Czechoslovakia and Hungary, the tests of both factor proportions and comparative costs hypotheses are carried out. The traditional Leontief approach to the problem is cross-examined by three other methods of structural analysis. The results reveal the presence of significant regularities in the behaviour of decision-makers in planned economies, even though some of these regularities may be considered paradoxical, when evalued according to the principles of comparative advantage.

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1. THE FORMULATION OF THE PROBLEM

When evaluating the performance of foreign trade in a socialist country some of its important features must be made clear just from the start. Even though the foreign trade in majority of planned economies always comprised a large portion of the local turnover of goods (in some of them even over 50% of domestic product) and the trade structure was far from being rigid, both in time and regionally, its pattern of specialisation was not expected to be on the principles of comparative advantage /or comparative costs/ because it could not be supported by systemic market requirements. Actually, the evolution of the corresponding pure theory of specialization was defiantly lagging behind and thus could not be applied in formulating the policies of development.

When finally the hypothesis of comparative costs was accepted as applicable - first in empirical estimates on microeconomic level, then as an explanatory economic theory - its standing as an

operational formally describable behavioural principle was hardly compatible with the economic rationale of the whole planning system. Its normative prescriptions were evidently inconsistent with the behaviour of local economic agents. The producers' tendency to minimize their reserves in fulfilment of the expected targets of the plan (see Hlaváček [1989]) could not be reconciled with the objective of profit maximization by having reallocated the resources according to comparative advantage. The microeconomic irrationalities of international division of labour in socialist countries contrasted sharply with the findings of those few studies dealing with some (generally macroeconomic) aspects of trade specialization based on Heckscher-Ohlin factor proportions hypothesis. See eg. Stolper, Roskamp [1961], Rosefielde [1974], Fink, Skolka [1979], Drábek [1979], [1981], Benáček [1988], for more insights. The empirical conclusions reached there were by far less objectionable from the view of theoretical norms of economic rationality.

The dual problems of our study can be stated as follows:

What kind of mechanism might have led the planned economies into such a neoclassically rational pattern of trade on macro level, when on micro level there had been neither reliable prices nor motives to base the "rational" decisions upon?

Is the microeconomic view on foreign trade specialization pattern based on comparative costs criterion still in contradiction with the macroeconomic (and quite sound) view based on factor proportions hypothesis, when the same data are use for both?

This paper presents first an outline of the potential explanation of the former problem and then some alternative attempts are made to reconsider the empirical evidence about the assumed inconsistence of the two theories of trade in planned economies (that are otherwise complementary in neoclassical environment).

2. AN OUTLINE OF INTERINDUSTRIAL TRADE FORMATION IN PLANNED ECONOMIES

The present author's attempt to outline the economic framework of trade specialization process in a small planned economy (viz. Benáček (1986a), (1986b)) leads to the following implications:

1. The industrial (sectoral) participation of a small planned economy in trade evolves from the situation of relative factor scarcities that are measured by resource balancing.
2. The resource balancing is performed by the planning centre on the national level (in the macroeconomic sphere) where the shortages of production factors (resources) are measured by non-price signals, e.g. by excess demand over supply in natural

units, length of queues, intensity of lobbies for resource allotments, etc.

3. Existing factor input imbalances are thus determined not only by actual country-specific factor endowments of the particular economy (i.e. by their aggregate supply) but also by the intensity of actual intake of factor inputs (i.e. by the requirements of aggregate demand).
4. Since the sectoral technologies, with their characteristic specific proportions among the mix of factor inputs, are assumed exogenously given to any small planned economy and the technical progress is assumed as not causing the factor intensity reversals, the aggregate demand for factors depends exclusively on previous allocative decisions of central planners about the entire domestic gross production. I.e. only the demand side is endogenous.
5. With the given relative factor intensities varying according to industries, a selective production expansion or contraction leads to changes in industrial output structure and to the shift in proportions of aggregate demands for factors.
6. Since the structure of domestic final demand is very sticky, **the only viable possibility to set for a change in aggregate demands for resources is by changing the structure of foreign trade – both on import and export sides**.
7. The only economic agent in the given environment that might have information, motive and power to change the trade structure is the planning authority. The change in foreign trade structure (i.e. in the pattern of specialisation) must be negotiated both internally and externally.
8. On an internal level the dialogue between the centre and the producers aims at engaging those commodities in trade that cause the minimal worsening of existing factor input constraints (imbalances). I.e. the aim is to engage in exports and in import replacing production those commodities that require intensive inputs of relatively abundant factor. At the same time the import controls are eased for those commodities only whose domestic production competing with imports depends on intensive usage of the relatively deficient factor. In fact that is the only workable strategy aimed at the growth of trade that may be the final and explicit objective of the centre. Factor proportions (i.e. the factor balancing) is a principle, which planners understand intuitively very well.
9. On external level the trade in usually negotiated with the partner planning authority in respective socialist country on grounds of her own factor constraints (endowments and factor demands). Inter-industrial trade evolves among countries with opposite (complementary) factor constraints; countries with similar factor constraints develop intra-industrial trade.

10. The procedure of macroeconomic factor input balancing, exercised by the planning authority (centre) in relation to alternatives of trade and specialization, resembles in its outcomes the Heckscher–Ohlin hypothesis. In fact it can be taken as a specific non-price modification of the factor proportions reasoning.
11. The comparative cost hypothesis in an ideal market environment is, however, only the microeconomic ex-post manifestation of the very problem of factor proportions. It is exercised as a static adjustment of individual producers to higher efficiency alternatives under given relative factor prices. As commodity prices are set by the world market, the maximal profit can be achieved only be taking part in the unique foreign trade specialization pattern, as it was predetermined by factor proportions.
12. Since the microeconomic sphere in socialist countries has been neither perfectly competitive nor has been operating according to the principles of the so-called "optimal planning", the microeconomic decisions about trade, lacking both relevant profit motives and information (e.g. prices), must be necessarily distorted.
13. In an imperfect economic environment, any independent decision-making of microeconomic agents (enterprises), with subsequent distortions in efficiency spilling over to the whole economy, is contradictory to the objectives of the centre that aims at minimizing the factor imbalances by specialization in trade in order to sustain the growth of trade.
14. The split into duality in the functioning of planned economies (enterprises versus planners) leads particularly in the foreign trade to possibility that the aims of macro sphere can be achieved even without achieving the Pareto-optimal level of production in the micro sphere. It is because planners can have the upper hand in the allotment of resources, even though the commands to make enterprises efficient are void.
15. The hypotheses 1–14 go beyond the prevailing common theoretical views on foreign trade functioning in planned economies, even though these views might be guided by the absolute or the comparative advantage argumentation. In order to evaluate the empirical relevance of our theoretical scheme, let us first test if there exists a relationship between a structure of trade and the intensity of factor usage by industries, respectively, between the structure of trade and the costs per unit-value of production.

3. THE BASIC TESTS OF TRADE SPECIALIZATION PATTERNS

By having assumed that in planned economies the macro and micro decision-making about industry's participation in trade can be separated from each other, since these are acts of different subjects following different objectives, we are free to test their decisions by using two different models. The information will be, however, the same. The input-output tables present a valuable (and irreplaceable) data resource for our purposes, as was so often found in similar circumstances, because it helps to approach the complexity of relations at both the macro and micro level.

The macroeconomic empirical testing shall follow the factor proportions hypothesis: assuming that foreign trade specialization depends on the intensity of factor requirements per unit-value of production, so that exports and imports are allocated into industries in a different pattern that depends on the particular relationship between the industry's factor inputs and the domestic relative factor availability (endowment). The microeconomic testing shall follow the comparative costs hypothesis: assuming that foreign trade specialization depends on relative technical differences between industries, as they manifest themselves in total costs per unit-value of foreign sales.

4. TESTS OF FACTOR PROPORTIONS

Leontief's traditional method shall be applied for our macroeconomic problem (see Leontief [1956], Baldwin [1971]). The method works with full (direct and indirect) physical capital and labour contents of a unit-value (1 mil. CS crowns = Kčs) of domestic production for exports and for hypothetical import replacements.

The data presented in our tests were taken from Czechoslovak (CS) 1987 (respectively 1982) I-O tables in current wholesale prices accommodated into 25 (respectively 42) sectors and from a time-series of CS I-O tables for 25 sectors in constant (1982) prices for the period 1967-1982. The capital stock is evaluated for gross physical stocks unadjusted for depreciation. Labour data refer to man-years employed. The natural resource sectors, excluded from some calculations, comprise agriculture, forestry, mining, energy, ore and fuel refinement. A large part of CS non-competitive imports is involved just in these industries. In order to present a more generalized view, a Hungarian I-O Table for 1981 in 42 sectors was also used. However, for more details about CS-Hungarian comparison or about the analysis of natural resources and human capital see Benáček [1988].

Table 1: Domestic full capital and labour requirements per 1 mil. Kcs of Czechoslovak production for exports and import replacements. (Weighted averages for 1987 composition with the natural resource sectors excluded).

Factor	Trade with soc. countries			Trade with capit. countries		
	Exports	Imports	X/M	Exports	Imports	X/M
Capital	2.449	2.780	0.881	2.984	2.926	1.020
Labour	7.127	6.563	1.086	6.768	6.338	1.068
K/L	0.343	0.423	1.232*	0.441	0.462	1.047*

* Leontief OMEGA statistic describing the K/L import/export proportions

Table 1 shows that Czechoslovakia was in 1987 a net exporter of labour services. This tendency is strongly complemented with net imports of capital in trade with socialist countries (rouble area). There the factor bias in trade, resulting in trade-offs between the factors is clearly visible and characterizes also the CS interindustrial specialization for whole trade. The results would be much more striking if the natural resource industries were included or if the sectoral breakdown were extended. For experiments with larger I-O tables, as the industries "open" themselves to reveal the interindustrial trade flows, resulted in a steady increase of all trade-off specialization characteristics. E.g. by switching from 25 to 42 sectoral table the OMEGA statistics increased from 1,32 to 1,78. Switching from full to direct factor intensities would result in a similar effect (see Hamilton, Svensson [1983], if they were allowed for.

Even more important finding was that no such tendencies could be observed in CS trade with capitalist countries (dollar area). There the findings were so ill-defined that no positive conclusion could be derived out of them. The results also failed to respond to the increases in the size of the statistical sample.

Table 2: Some Czechoslovak trade specialization characteristics for 1967 - 87

Characteristics	1967	1973	1977	1982	1987
OMEGA statistics	1.131	1.190	1.174	1.241	1.319
K/L (export)	0.144	0.193	0.231	0.295	0.374
K/L (import)	0.161	0.229	0.271	0.366	0.494

Table 2 presents Leontief OMEGA statistics for a time-series of CS I-O tables in constant (1982) prices. The data include the natural resource sectors. Unfortunately the 1987 table is in a different sectoral breakdown (25 instead of 28 industries) and in current prices. The essential finding here concerns the persistence of the trend, while all our previous conclusions about the behaviour of CS trade data remain valid.

The analysis of Hungarian trade pattern also fits well into our findings. Let us remind that both countries are similar in size, geographical location and cultural traditions. Their natural resources are similarly frail and K/L ratio evolved in similar patterns. Our factoral estimates for 1981 also show similar tendencies. (Disclaimer: The breakdown of the Hungarian trade data into two trading areas is a result of our compilation. Since the indirect evidence used for that purpose is not a sufficient substitute for the real data, the results must be judged with an utmost caution.)

For a brief illustration: Hungarian data lead to a similar paradox in the inconclusivity of trade pattern with capitalist countries (where Hungary becomes a net exporter of both factors, with net capital export bias slightly prevailing). This tendency is coupled with a strong bias in trade with socialist countries to net capital imports traded-off for net labour exports, with OMEGA statistics reaching the value of 1.32 (the natural resource sectors were omitted from these calculations). In Hungarian total trade there is also observable a long-run tendency for labour intensive exports, as the results of Fink, Skolka [1979] for 1968 and Boda [1984] for 1974 confirm.

All the mentioned evidence would support a view that socialist countries do follow the Heckscher-Ohlin factor proportions model in their search for specialization in the international division of labour, at least with some partners.

5. TESTS OF COMPARATIVE COSTS

The testing of the microeconomic aspects of the trade specialization problem will be approached by a sectoral cost function of type:

$$c_i = r\,k_i + w\,l_i \qquad \text{(see the legend bellow)}$$

However, the function must first be adjusted to our problem. It should be calculated per a sectoral unit-value isoquant of foreign trade sales, including the intermediate consumption of both domestic and import origin. Then there should be taken into consideration the non-existence of markets for factors in socialist economies, resulting in specific local evaluation of factoral services. Last but not least, the difference between the domestic wholesale and the foreign trade pricing should be allowed for. The

latter represents a socialist cost in form of trade subsidies or taxes on top of domestic (internal accounting) costs.

The following formulae were applied to this problem:

$$c_i = r_i \tilde{k}_i + \bar{r}(k_i - \tilde{k}_i) + w_i \tilde{l}_i + \bar{w}(l_i - \tilde{l}_i) + \tilde{m}_i \qquad (1)$$

$$c_j^X = \sum_i (c_i \ \beta_{ij} \ X_{ij} \ / \ \sum_i X_{ij}) \qquad (2)$$

$$c_j^M = \sum_i (c_i \ \beta_{ij} \ M_{ij} \ / \ \sum_i M_{ij}) \qquad (3)$$

Wherein:

i = 1,2, ... 25 specifies industries (sectors);
j = 1,2 specifies trading areas (socialist and capitalist countries);

c_i = i-th industry's full costs in internal wholesale prices, including intermediate consumption of domestic origin;

k_i, l_i = full physical capital, respectively labour requirements per unit-value of final production;

$\tilde{k}_i$, $\tilde{l}_i$ = direct physical capital, respectively labour requirements per unit-value of gross production;

r_i = industry coefficients of capital stock "rental" (derived from industry depreciation rate multiplied by opportunity cost coefficient of 1.556);

w_i = industry coefficient of labour cost per year (derived from industry wage-bill multiplied by opportunity cost coefficient 1.18);

$\bar{r}$ = average capital stock "rental" (5.6% p.a.);

$\bar{w}$ = average labour cost (0.04727 mil. Kcs per man-year);

$\tilde{m}_i$ = full requirements of imports for intermediate consumption per unit-value of final demand;

c^X_j, c^M_j = full cost of production required per unit value of exports, respectively of domestic import replacements (in foreign trade prices);

β_{ij} = price deflators accommodating the internal prices into foreign trade Kcs prices in FOB CS border parity;

X_{ij}, M_{ij} = exports, respectively imports by i industries and j trade areas.

The hypothesis that $\mathbf{c^X_j \ / \ c^M_j < 1}$ was tested (see Table 3). Except the foreign trade ("external") costs, we also calculated full domestic ("internal") costs, where the value of coefficient β_{ij} in (2) and (3) was set to 1. For comparative purposes orientational

estimates were made for the Hungarian trade in 1981 with factor "prices" set to $\bar{r}$ = 5% and $\bar{w}$ = 0.07025 forints.

Table 3: Full costs per unit-value of trade
(In millions of local currency, natural resource sectors excluded)

	"External"			Internal costs		
COMPOSITION	**X**	**M**	**X/M**	**X**	**M**	**X/M**
CS. trade 1987:						
with soc. countries	**0.681**	**0.842**	**0.809**	**0.656**	**0.750**	**0.875**
with cap. countries	**0.810**	**0.835**	**0.970**	**0.778**	**0.764**	**1.018**
Hung. trade 1981:						
with soc. countries	**-**	**-**	**-**	**0.723**	**0.742**	**0.974**
with cap. countries	**-**	**-**	**-**	**0.749**	**0.736**	**1.018**

Also these tests do not prove our hypothesis false, if the trade with socialist countries is considered. However, a different conclusion must be derived from tests concerning the trade with capitalist countries, the tested hypothesis of which must be refused. Also the Hungarian evidence leads to generally weaker conclusions.

If we return back to our hypotheses 12 and 13 in the introductory part (i.e. about the independence of micro and macro decisions in trade specialization and about the loss of rationality in the former), our tests did not permit us to accept them. At least in some important cases (i.e. in trade among the socialist countries) the specialization pattern, that was consistent with the Heckscher-Ohlin model of factor proportions, seems to coexist well with Ricardian principles of comparative advantage. On the other hand, there is another conclusion that prompts itself: when one of the mentioned principles gets distorted, the remaining one does so, too. This new fundamental hypothesis needs further examination.

6. THE LEAMER'S ATTACK

The CS and Hungarian results are in many ways similar in their composition to Leontief's [1956] original findings for USA in 1947. Leamer's [1980] fierce attack on Leontief's results raised a question if the whole course of argumentation was correct. Is the CS and Hungarian case not just another Leontief's paradox? Leamer's argumentation coincides well with the reasoning laid down in our introduction (see points 3-6). Accordingly, the factor proportions hypothesis is consistent with Leontief's test (for a country better endowed with labour relatively to capital) only if the K/L ratio for total exports is less than the current K/L ratio of domestic final production. Of course, if the K/L ratio for import replacements is even systematically higher than both previously

mentioned, the more convincing is the test. The importance of this second part of the test depends very much on the share of competitive imports on the total. If the non-competitive imports dominate (what is often said about the trade of socialist countries), the import side of the K/L reasoning can be omitted.

Table 4: Full (direct and indirect) capital/labour intensity of exports, domestic production for final demand and import-replacing production.

	Czechoslovakia 1987		Hungary 1981
Capital/Labour	Soc. countries	Cap. countries	Total trade
K/L (export)	0.347	0.444	0.488
K/L (final demand)	0.381	0.381	0.551
K/L (imports)	0.512	0.457	0.561

Table 4 presents a new evidence. CS trade pattern with socialist countries is consistent with the hypothesis outlined above. On the other hand, the CS trade with capitalist countries fails the test, even though the data for exports and imports would misleadingly suggest the opposite. The Hungarian tests are consistent with our hypothesis – if the import tests were omitted. We can conclude that Leamer's argument does not go against our positive findings about the specialization pattern of trade among the socialist countries.

7. THE RCA CROSS-EXAMINATION

The revealed comparative advantage (RCA) represents an independent method of factor proportions testing that can be exploited as cross-examining complement to I-O methods. There the specialization pattern, defined as $X_i - M_i$ sectoral trade balances, is regressed on a list of explanatory variables that represent the intensity of capital, labour, natural resources and/or technical progress, as required in production. The statistically significant coefficients with a positive sign point to the export specialization factor, while those with a positive sign point to the import structure-forming variable.

CS data were tested by the following econometric model:

$$\mathbf{X_{ij} - M_{ij} = f_j\ (\hat{k}_i, \hat{l}_i, g_i, q_i)} \qquad (4)$$

wherein:
i = 1,2, ..., 38 specifies industries,
j = 1,2 specifies socialist and capitalist countries,

$\hat{k}_i, \hat{l}_i$ = direct capital and labour coefficientS per unit-value of gross production,

g_i = ton weights of unit-value of traded production, as a proxy for natural resource intensities,

q_i = correlation indexes of qualification and/or technical progress requirements of production (see UNIDO [1986]).

The least squares estimates for CS trade with socialist countries in 1982 have given the following characteristics:

$$X_{il} - M_{il} = 1474 - 3786\,\hat{k}_i + 552\,\hat{l}_i - 3.46\,g_i + 2235\,q_i + \varepsilon_{il}$$

(1.4) (−7.2) (2.5) (−0.6) (0.7)

$R^2 = 0.69$ $F(4.38) = 18.1$

The t-test is indicated in parenthesis.

As we can see, there were only two statistically significant variables determining the extent of trade surpluses or deficits in industries (and thus with it the pattern of specialisation): net exports are proportional to labour intensities in production while net imports are capital intensive. The estimates for capitalist countries were not statistically significant, with $R^2 = 0.03$. The estimates for Hungary have shown similar, though less significant results (e.g. R^2 for trade with socialist countries was 0.36).

All these results are also fitting well into the picture sketched by our Leontief's analysis. At this point we may derive a conclusion that the Heckscher-Ohlin factor proportions model presents a meaningful explanation of interindustrial trade formation in planned economies, if the specialization pattern is limited to trade among them.

8. THE OPTIMIZING SIMULATION TESTS OF EXPORT EFFICIENCY DEEPENING

We can finally proceed to the final verification concentrated on the link between the comparative costs and factor proportions. Let us test if in small planned economy the sectoral costs c_i of export production are really independent of the evolution of aggregate factor requirements. We presume that a deepening of specialisation according to comparative advantages will keep export costs c_i lower than costs in import replacements.

The problem can be approached by a linear programming simulation of export restructuring (by industries) according to comparative advantages. We can ask how the factor proportions in export production would behave, if the individual producers allocated their exports in accordance with the least cost per unit-value of foreign sales. The parallel dual problem rests in a maximization of profit per a unit-value of given exports.

The choice among alternatives is limited by the scarcity of resources. Except for the capital and labour we shall consider the availability of imports for intermediate consumption and the fuels as two less customary, but typical barriers of growth for a socialist economy. The availability of a resource for export production is expected to depend on two conditions:

- how its redistribution between the production for exports and domestic use from the total stock (endowment) is regulated;
- how operative is mobility of the resource between alternative user's inside the export production.

As the costs are expended in internal prices and the export revenues received are in "external" prices, the interconnection between them should be also incorporated into the model. The hypothesis to be tested can be stated in the following way: if the allocation of resources is done subject to Ricardian comparative advantage, will the outcome in factor allocation be consistent with the existing macroeconomic proportions in factor usage? This problem was tested on the following model:

$$\sum_i \sum_j c_i \beta_{ij} e_j (X^*_{ij} / X^*) \rightarrow \text{MIN} \qquad (5)$$

I.e. in the objective function the minimal outlay of national costs per unit-value of weighted average composition of exports is sought. The task is subject to following constraints:

$$\sum_j k_i \beta_{ij} X^*_{ij} \leq k_i X^o_i \overline{b}$$

$$\sum_j k_i \beta_{ij} X^*_{ij} \geq k_i X^o_i \underline{b}$$

$$\sum_i \sum_i k_i \beta_{ij} X^*_{ij} \leq \sum_i k_i X^o_i \overline{u}_1$$

$$\sum_i \sum_i l_i \beta_{ij} X^*_{ij} \leq \sum_i l_i X^o_i \overline{u}_2$$

$$\sum_i \sum_i m_i \beta_{ij} X^*_{ij} \leq \sum_i m_i X^o_i \overline{u}_3$$

$$\sum_i \sum_i f_i \beta_{ij} X^*_{ij} \leq \sum_i f_i X^o_i \overline{u}_4$$

$$\sum_i \sum_i X^*_{ij} \geq M + B$$

wherein:

i	=	1, 2,..., 25 (industries),
j	=	1,2 (socialist and capitalist countries);
X^*_{ij}, X^*	=	optimized variables – exports in FOB prices by industries and countries, respectively their total;
c_i	=	full costs of export production in internal prices;
β_{ij}	=	price deflators accommodating distorted internal prices into "external" (foreign trade) prices;
e_j	=	correction coefficient for equilibrium exchange rate;
k_i, l_i, m_i, f_i	=	full (direct and indirect) capital, labour, import for intermediate consumption and fuel requirements per unit-value of final production;
X°_i	=	real initial flow of exports by industries;
M, B	=	required level of imports and the balance of trade;
$\bar{b}$, $\underline{b}$	=	coefficients determining the upper and lower bounds of mobility of capital inside and/or among industries (and ipso facto of all other factors) for expanded or contracted export production;
$\bar{u}_1, \bar{u}_2, \bar{u}_3, \bar{u}_4$	=	coefficients determining the upper bounds of total stock of factors available for restructuring the export production.

Table 5: Stimulated full factor and cost requirements per 1 mil. Kčs of Czechoslovak production for exports and import replacements after optimisation (1987 data with natural product sectors excluded).

	Trade with soc. countries			Trade with cap. countries		
	Export	Import	X/M	Export	Import	X/M
Capital	2.300	2.780	0.828	3.549	2.926	1.213
Labour	6.526	6.563	0.994	8.016	6.338	1,265
K/L	0.352	0.423	1.201*	0.443	0.462	1.043*
Extern. costs	0.580	0.842	0.689	0.715	0.835	0.856
Intern. costs	0.706	0.750	0.941	0.787	0.764	1.030

* Leontief OMEGA statistics

Because our interest is concentrated exclusively on a descriptive analysis and not on prescriptive projections, in our tests all economic constants were set to the real values of the analyzed period (e.g. 1987). The bounds control variable $\bar{u}_1$ through $\bar{u}_4$ were set to 1, $\bar{b}$ to 1.3 and $\underline{b}$ to 0.5, simulating thus a hypothetical 5 year adjustment period for optimal factor

reallocation. If a feasible solution could not be found in our experiments, the problem usually had rested in the lack of fuel resources, capital or imports, the shadow prices of which in majority of feasible runs were positive. In no case the simulations for Czechoslovakia in 1987 (or 1982) and Hungary in 1981 ended up with the labour being earmarked as a limiting factor, even though the optimal solution for trade kept inclining to labour intensive exports. This finding can be taken as an indirect evidence that in CS and Hungary the labour is really that relatively more abundant factor (though well engulfed in the "reserve army" of over employed), which can be most easily mobilized for the fulfilment of economic tasks of growth, including the growth of exports.

Results concerning the factor proportions and costs, as derived from CS 1987 data and shown in Table 5, are not so unexpected (please compare with Table 1 and 3). While the average export costs in "external" prices were cut down significantly by optimization procedure, e.g. from original 0.681 and 0.810 to 0.580 and 0.715 for exports to socialist and capitalist countries, the factoral relative composition of exports did not undergo such changes. The trade with socialist countries retained its previous K/L characteristics pointing to labour for capital trade-off. The trade with capitalist countries also remained sticking by its previous factoral ambiguity and indeterminacy. What worsened were the export costs accounted for in internal prices (0.706 and 0.787 for exports to socialist and capitalist countries) while the original values were 0.656 and 0.778.

The latter result is of top importance, because it discloses that the whole CS trade in its dynamic evolution may be challenged by a far reaching paradox: an intensive optimization of the industrial and territorial structure of trade, if the objective was to maximize the global social effect from national comparative advantages, can lead to a factual deterioration of the position of producers and exporters, if the national effect is re-audited from view of actual internal (local) costs and profits. The more surprising is that the greatest internal losses were incurred in trade with socialist countries, where the results of previous statistic analysis seemed to be quite encouraging.

The split of information base for decision-making in planned economies into a two tier price system, supported by fiscal redistribution, caused that true information about the efficiency of trade specialization become blurred, distorting thus the decision-making of trading subjects and leading to contradictions between the local (micro) and social (macro) interests. So the dynamic side of comparative advantage has revealed its much less favourable aspects of performance in a planned economy than what its static results may have suggested.

9. C O N C L U S I O N S

In our empirical tests of Czechoslovak and Hungarian trade data the hypotheses of Ricardian comparative advantage and Heckscher-Ohlin factor proportions seem to be positively correlated. Both theoretical principles appear as robust concepts particularly in the analysis of trade among the socialist countries.

The results of the traditional Leontief method, concentrated on the analysis of factor contents of production for exports and domestic import replacements, did not contradict the hypothesis that both Czechoslovakia and Hungary are countries specializing in labour intensive exports and capital intensive imports, if the existing pattern of industrial specialization among the socialist countries is considered. Our analysis following the Leamer's argumentation, as well as the analysis of revealed comparative advantage approach and optimizing simulations arrived at similar conclusions.

On the other hand, our tests of Czechoslovak and Hungarian trade with capitalist countries ended in inconclusive and ambiguous results that permit to refuse the hypothesis that comparative advantage or factor proportions could be taken as a meaningful model of behaviour of economic agents of a small socialist country in trade with the convertible currency area.

Our tests did not support the view that the microeconomic irrationalities in the trade of socialist countries could coexist with macroeconomic rationality, even if both were measure in their broadest sense. Our evidence points to a complementary relationship between them: the presence of comparative cost rationality of trade is concomitant with the presence of its factor proportions rationality, while the absence of one is concomitant with the absence of the other.

The tests of dynamic links between the comparative costs and factor proportions disclosed that the positive interaction between them at external (foreign trade) prices was accompanied by a negative influence on efficiency and profits accounted for in internal prices. This may lead to a clash between social and local interests in the specialization of trade, casting thus serious doubts on the meaningfulness of any specialization criteria.

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