



## TOPICS IN TRADE COORDINATION OF PLANNED ECONOMIES

The original focus of this book was on the coordination of the Comecon system by means of prices. As the study progressed, however, the author found it necessary to concentrate on a formalised modelling of the problem which in turn led to the adoption of a game construct. In this way inquiry has moved from its original single focus to a multi-focal exercise.

The study is drawn up in two parts. In the first part the author outlines the Comecon mechanism as it operates *de facto*; this is followed by the presentation of some informal ways of effecting a very rough coordination of plans between the member-countries. Still in the same part, he gives an analytical survey of formal modelling work in the field of his concern, which largely means the contributions by the Polish and the Soviet schools of thought. Of the remaining three chapters, forming part two, the third deals with the discussion of modelling a multi-economy system as a game, be it antagonistic or non-antagonistic; chapter four forms, as it were, a preface to the final chapter, discussing some issues encountered in constructing a differential game of intra-Comecon trade and pricing; and the fifth chapter gives an outline of the Comecon game-theoretic design in three 'formats': of an 'instantaneous' differential, a bargaining and quasi-auctioneering games pattern.

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# **Topics in Trade Coordination of Planned Economies**

**Alfred Zauberman**



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**To my wife**

## Editor's Introduction

With the present book Dr. Zauberman combines the work of the mathematical branch of East European, and particularly of Soviet, economics in the very important field of game theory with the very real problems of trade coordination as they appear in the everyday functioning of the socialist countries. By focusing on differential games on the one hand, and the modelling of CMEA integration using the price mechanism on the other, the author has analysed two areas of particular interest to economists in the socialist countries, to economists in the West studying developments in the centrally planned economies and also to Western economists generally.

Since he published the first article in the West on the objective function in macro-level planning in the Soviet Union in 1965 — an area which he revisited in 1970 in the *Jahrbuch der Wirtschaft Osteuropas* — Dr. Zauberman has also focused on the formulation of the objectives of the planners in foreign trade relations. The differential game approach to CMEA trade coordination allows the objectives of the planners to be expressed in a dynamic framework; it also explicitly recognizes the existence of a number of controllers (the individual CMEA countries) and the role of control over intra-CMEA trade exercised individually by the participants in the game. This allows a sophisticated mathematical economic treatment to be made of the very real problem where the individual member-countries of the CMEA region pursue objectives which differ among themselves and which, in particular, may differ from the objective of the system as a whole insofar as one does exist.

In addition to his lecturing on techniques of normative and indicative planning and the control-theoretic approach to planning at the London School of Economics and Political Science, Dr. Zauberman has in recent years been a Visiting Professor or Senior Fellow at a number of American, Canadian and West German universities, and at the Vienna Institute for Comparative Economic Studies. The Vienna Institute is very pleased to present to its readers this extended version of a study developed during his stay at our Institute.

On behalf both of the author and of myself I would like to express our appreciation to Fred Prager for the very careful editing of a difficult text.

F. Levčik

## Contents

	Page
<b>Foreword</b> .....	<b>11</b>
<b>Part I Coordination Problems — Attempts at a Solution</b> .....	<b>15</b>
<b>Chapter 1 Background to the theme</b> .....	<b>17</b>
A. The CMEA realities .....	17
Notes .....	20
B. "Traditional" ways of CMEA coordination — — some attempts at partial formalization .....	23
Notes .....	27
<b>Chapter 2 Critical Presentation of Some Main Models for CMEA Integration by Means of Prices.</b> .....	<b>32</b>
A. Introductory observations on a nonrigorous treatment of a theme .....	32
B. The Polish school of thought in modelling .....	32
Note .....	38
C. The new Soviet school of thought in modelling .....	39
Notes .....	49
D. Some observations on theoretically and empirically detected limitations to coordination by efficient price .....	52
<b>Part II Differential-Game-Theoretic Coordination of a Multi-economy System</b> .....	<b>59</b>
<b>Chapter 3 Further Discussion of Modelling a Multi-economy System as a Game, Antagonistic or Nonantagonistic</b> .....	<b>61</b>
Notes .....	63



<b>Chapter 4</b>	<b>Differential Game of Intra-CMEA Trade and Pricing.</b>	
	<b>Some constructional issues confronted</b>	<b>66</b>
	1. The alternative: differential game as against more general dynamic game formalism for the purpose.	66
	<i>Excursus</i>	67
	2. Scope for inter-economy game optimization; relation to plans of member-economies.	69
	3. Relating the community's philosophy to reality in some aspects of the game's construction	69
	4. The stochastic elements in the game. Hints at possible treatment. Harsanyi-Selten indications at Bayesian approach. Applicability of certainty equivalence. Tintner-Sengupta recommendations.	70
	5. Implications of hierarchic structure of the game as related to the criterial function	72
	Note	73
	6. The property of co-operativeness in the game	73
	7. The strategies and types of equilibrium considered for the game (Pareto versus Nash equilibrium; also Stackelberg concept)	74
	Notes	76
<b>Chapter 5</b>	<b>Outline of the CMEA Game-theoretic Design</b>	<b>80</b>
	1. The three formats of the game adopted: "A" – "instantaneous" differential game; "B" – bargaining procedure; "C" – quasi-auctioneering type of procedure	80
	Note	80
	2. "Side"-model for extra-CMEA trade (with the outside world). Pan's construct assimilated	81
	3. Notional and notational scaffolding for intra-CMEA trading	82
	4. "Translation" of formalism into CMEA "reality"	83
	Notes	84
	5. Physical and money-terms of design defined	85
	6. Regime for the <i>format</i> "A" described. Hamilton-Jacobi-Bellman model adopted. Assimilation of Starr-Ho version (with Dynamic Programming)	86
	Note	88
	7. Implications of Nash equilibrium reviewed within adopted framework	88
	8. Some numerical techniques for solution indicated (internal Newton-Raphson method, Zoutendijk method, Pau-developed searching procedure)	89

9. The alternative design based on the Pontryagin Principle sketched out; Zukhovitskiy-Polyak-Primak construct assimilated . . . . .	90
10. Bargaining game-theoretic framework for format "B" discussed (based on Harsanyi-Selten concept) . . . . .	92
11. Regime for the <i>format "B"</i> described (for situations where "A" yields no solution) . . . . .	93
12. Numerical example of situations in "A" and "B" and contingency dealt with in "C" . . . . .	95
13. Numerical example 12 discussed. . . . .	96
14. Regime for <i>format "C"</i> described: auctioneering-type procedure to deal with residual in the "pool" . . . . .	97

## Appendix

1. The <i>Antimonov</i> coalitional model. . . . .	101
2. The <i>Krass</i> design for cooperation of models . . . . .	102

Postscript. . . . .	105
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Index . . . . .	107
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## Foreword

The original focus of the present study was on the coordination of the CMEA (Council for Mutual Economic Assistance) system by means of prices. As our inquiry proceeded it has tended to extend into one of the harmonization of a family of mandatorily planning economies (and indeed touching on still wider problems of system harmonization). In this process the more general framework of the issues involved has come to the fore. (Some of them are germane to those elaborated in *Mathematical Theory of Decentralization in West and East*, forthcoming.) Such more expanded theoretical analysis has induced concentration on a formalized modelling of the problem; and, in turn, such modelling of coordination has induced the adoption of a game construct. In this way our inquiry has moved from its original single focus to a multi-focal exercise.

Thus while our study has gained in width, a price had to be paid in terms of organizational robustness. To mitigate it somewhat we have shifted a good deal of the theoretical material into notes, excurses and appendices which are likely to be skipped by some readers.

Multi-focal though the study has become, it is still built up around the specific CMEA case. It may then seem appropriate to offer a few introductory remarks on this case.

Without defining the concepts at this stage, we heuristically take them to entail a degree of integration of the economies involved. Our terms of reference direct us to the CMEA "as it is". We have, however, to allow for adjustments of operating mechanisms such as follow from the integrational process pursued (there is a certain causal "feedback" between the goal of integration and the instruments).

Indeed, the formal "scaffolding" of our inquiry is expected to help in clarifying such implications. Nonetheless the assumption is to preserve structural fundamentals as rooted in the philosophy adhered to. This being so, and although, according to its constitution,

economies differently structured and operating different mechanisms are not excluded from its membership, the CMEA is *de facto*, and may be presumed to remain, a family of planning economies, specifically of economies operating a mandatory kind of planning.

Now, it has been argued that it is of the essence of the logic of a community of mandatorily planning economies that its effective coordination requires a common mandatory plan. (The argument rests on the point that, where a plan's element is to be derived by one member-economy from a plan of another, such mutual dependence entails an overall, enforceable, harmonization.) We do not intend to prejudge the issue; at least, not at this stage. But we do accept as a point of departure — as part of our axiomatic frame — that evolving a rational system of prices for the community as a whole does require some planning, bringing out the “dual” broadly in the mathematical-programming sense. To be sure, at this point we use the term without reference to any rigorous optimization concept; we are not committed, for the moment, to the nature of “effective” coordination: were this to be an “optimal” coordination, we would have to postulate a programming (or, in dynamics, optimal controlling) type of the community's “plan”: the plan for the community as an integrated whole (as it is usually qualified, by modellers in the field, by the clause on preserving the identity of the individual component-economies).

Once this type of plan is assumed, the objective and the constraints, subject to which the objective is pursued, call for specification. In anticipation of what will be said further on, we may stress already at this point that during nearly a quarter of a century of its existence the CMEA has not reached a stage of any formal procedure for optimizing its activities: in fact, it has largely relied on sundry bargaining procedures (as a rule bilateral) rather than on any overall plan, in particular on any formalized plan-programme. A recently adopted CMEA resolution calls for coordination of medium-term and longer-term plans, with a 10 to 15 years' horizon, as well as for a joint forecasting of developments in the economy, science and industrial technology, seen as an important element of planning. The declared intention, moreover, is the “perfecting” of coordination processes — an allusion to the use of advanced techniques.

The study is drawn up in two parts. In the first part we outline the CMEA mechanism as it operates *de facto*; this is followed by the presentation of some informal ways of effecting a very rough coordination of plans between the member-countries. Still in the same part, we give an analytical survey of formal modelling work in the field of our concern, which largely means the contributions by the Polish and the Soviet schools of thought. Of the remaining three chapters, forming part II, the third deals with the discussion of modelling a multi-economy system as a game, be it antagonistic or non-antagonistic; chapter four forms, as it were, a prolegomenon to the last chapter, discussing some issues encountered in constructing a differential game of intra-CMEA trade

and pricing; and the fifth gives an outline of the CMEA game-theoretic design, in three “formats”: of an “instantaneous” differential, a bargaining and a quasi-auctioneering games pattern. A more detailed specification for these two chapters will be found in the table of contents. In our modelling we have confined ourselves, of necessity, to a mathematical sketch. Far from making any claim to definitiveness, we treat it as a first, tentative step in the exploration of what seems to us a rewarding direction worthy of being followed up in further research.

In acknowledging the author’s indebtedness I should first mention the Vienna Institute for Comparative Economic Studies (Wiener Institut für Internationale Wirtschaftsvergleiche) for an invitation which gave me a chance to work on the subject and for aegis offered for this work. Personally my thanks go to the former Director of the Institute, Prof. Dr. F. Nemschak, and to its present Director, Dr. Dr. F. Levčík; I greatly appreciate, in particular, their broadmindedness in perceiving the pertinence – not immediately apparent – of my theme, for their Institute’s area of research.

Chapters 4 and 5, which in a sense are the core of the study, were revised when I was visiting professor at the Institute of Mathematical Economics, Bielefeld University. I am grateful to its Director, Prof. Dr. Selten for the invaluable long discussions on the problems dealt with in those chapters, especially in the field of his prominence – the bargaining-theoretical aspects of the game construct.

As always in my publications over many years, I wish to acknowledge once again my debt to the London School of Economics and its Director, Prof. Dr. Dahrendorf, for support enjoyed.

Finally to Prof. Dr. Tintner, who dropped his anonymity as the Referee, I wish to express my gratitude for recommending publication.

None of the acknowledgements entails anybody’s responsibility but mine for any imperfection of this study or for the faults (of which in the new modelling experiment in particular there are likely to be quite a few).

Alfred Zauberman  
The London School of Economics



## **PART I**

### **Coordination Problems – Attempts at a Solution**



