An Econometric Analysis of the World Zinc Market

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Abstract: A fairly detailed market form of econometric model is built, based on the technological, behavioral and institutional features of the world zinc industry. An estimated version of the model indicates different systems of lag responses in the structures of demand and supply to the price of zinc, a very poor substitutability on the demand side, free market price as a long-run equilibrator for the U.S. producers' price, and an important influence of the U.S. interventions on the world market. The model meets reasonably well the predictability criterion based on the technique of dynamic simulation. The performance properties of the world zinc industry, analysed through dynamic multiplier simulation technique, show that the industry exhibits a reasonably stable market environment to the exogenous disturbances such as an increase in the activity levels of consumers and variations in the prices of substitutes. It is, however, quite sensitive to technological changes in the consumer industries. The stockpile policy of the U.S. Government does not seem to be properly geared to its objectives and, in general, it seems to have restricted the development of the industry as a whole.

1. Introduction

The world-wide instability in the growth of free market economies has attracted the attention of many economists and encouraged them to have a closer look into the structure behaviour and performance of the primary commodity markets. Zinc somehow seems to have escaped the attention of the economists, altogether. This may be attributed to (1) lack of adequate information on the organisational structure of the industry which is an essential ingredient in a model building exercise, (2) a relatively low proportion of zinc in the total cost of the final product in most of its major uses, (3) concentration of the resources containing zinc in relatively rich countries (except Mexico and Peru) where foreign exchange earnings from the export of primary commodities is not a binding constraint to their economic development.

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3) Labys [1975] in his extensive bibliography lists about 241 studies of commodity markets, ranging from aluminium to wool, a majority of which were undertaken during the last ten years.
Nevertheless, the recent rise in the price of zinc has been so alarming, relative to other primary commodities, that it warrants a thorough study in terms of its market structure, behaviour and performance. Furthermore, such a study is important for the policy makers and planners of the zinc industry. In the following section of this paper, we present the main results of the investigations on the organisational structure of the industry which guide us in modeling of the world zinc market later. In section three, econometric estimates of the models are discussed. The fourth section is devoted to test the validity of the model and the policy simulations analyses of some interesting scenarios facing the world zinc market.

2. Organisational Structure and Modeling of the World Zinc Industry

2.1 Organisational Structure

[For a detailed discussion of these aspects see Gupta, 1981]

Consumption of zinc, an intermediate input widely used in construction, automobiles, arms and ammunitions, household appliances, and many other manufactured commodities, is concentrated in the industrially advanced countries. The U.S.A. alone consumes about one-third of the total zinc used in the F.M.E. (Free Market Economies) world. Other major consumers of zinc are Japan, U.K., France, and West Germany. The above five countries consume about seventy per cent of the total zinc available in the F.M.E. world. However, this degree of concentration in consumption does not exert any significant influence in terms of market power on the buyer's side. This is so because of a large number of small and unco-ordinated decision making units that use zinc in numerous forms in manufacturing a wide variety of commodities.

Production of zinc ore and the associated mineral resources, though spread throughout the world, are more centralised in Canada, U.S.S.R., U.S.A., Australia, Mexico, Peru, and, to a smaller degree, in a few of the European countries. Canada, Australia, Mexico and Peru together produced about 53 per cent of the F.M.E. world zinc ore production in 1974. However, in terms of the international market for zinc, these countries, in the same year, shared in more than 80 per cent of the exports of zinc ore and about 56 per cent of the exports of zinc metal in the F.M.E. world. Apparently, this implies a high degree of concentration and, therefore, the possible presence of monopolistic elements on the sellers' side of the market. However, further investigations into the organisational structure of the industry both at present and in the past, do not support this view. The basic arguments in this regard may be briefly noted as below:

(a) There are many producers in each of the above-mentioned countries whose decisions are not co-ordinated within each country (except for the U.S.A.). This

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4) Zinc falls into the category of strategic materials of the U.S. Government, and in the list of important commodities of the United Nations. This is also reflected in the numerous attempts of the U.S. Government to intervene in the working of the world zinc market and that of the U.N. to co-ordinate policy-making in the industry. [For details, see Gupta, 1979, Chapters II and III.]