Exogenous Information and Input-Output Updating: An Evaluation

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Input-output coefficients' intertemporal instability, costs, and time lags involved in the construction of survey-based tables necessitate employment of nonsurvey updating techniques. Analysts, however, may want to include exogenous information in the updating process. The issue, then, is whether this inclusion ameliorates or aggravates the results. This paper attempts to assess the wisdom of incorporating exogenous information into the updating procedure. First, using the naive, RAS, and LaGrangian techniques, the 1966 table of the former Soviet Union was updated to 1972. Next, treating the top 10 percent largest 1972 coefficients as exogenous estimates, the remaining coefficients were updated via the same three methods. Comparison of the results indicates that exogenous determination of the largest coefficients does not change the methods' rankings while yielding substantial improvements in the forecasts. (JEL C67)

Background

Input-output (I-O) tables are compiled via surveys and are utilized for several years thereafter. However, I-O coefficients are intertemporally unstable. Thus, the results obtained through using the latest survey-based tables may be less than reliable. Attempts have been made to device shortcuts for updating the tables without actual surveys. The efforts resulted in the emergence of numerous, nonsurvey updating methods, although the proposed methods are minimum requirement techniques. Many researchers have wondered if the updated tables could be made more accurate if certain segments of the target year's table were exogenously estimated and if the updating techniques were used only to update the remaining portions. The question is, first, should additional exogenously determined information be combined in the updating process? Second, if that answer is affirmative, then to obtain the best results, what criteria should be used to select coefficients for exogenous estimation? The answers to these two questions will enhance the understanding and usefulness of I-O analysis. If this procedure improves the accuracy of the results, then better updated tables can be obtained and the important segments of tables may be identified and treated more carefully during the survey and construction phases.

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Many analysts (for example, Lecomber [1964], Allen [1974], Allen and Lecomber [1975], Jensen and West [1980], Hewings [1984], and Miller and Blair [1985]) believe that it is advisable, and indeed sometimes necessary, to utilize additional information in the updating process. The inclusion is expected to improve the estimates, and, in fact, many researchers report improvement in the results due to employing exogenous data. However, incorporating additional data (as, for example, Miernyk [1976] and Israilevich [1986]) can lead to inferior overall results in some cases. Moreover, determining which method is appropriate for selective targeting is still a matter of concern.

Data

For experimental purposes, this paper will utilize the former Soviet Union's I-O tables of 1966 and 1972, expressed in the current producer's price. These were compiled at the Foreign Demographic Analysis Division of the Bureau of the Census of the U.S. Department of Commerce by Kostinsky [1976] and Gallik et al. [1983]. The original tables are larger than used here. However, for the purpose of this paper, the tables were aggregated to be operationally compatible. The final tables utilized in this work contain 71 producing sectors, one column vector of final demand, and one row vector of value added.

The reliability of the Soviet data is not directly addressed here. However, as noted by Kostinsky [1976] and Gallik et al. [1983], the present tables were constructed using a variety of sources and, for the most part, have been through cross checks. As such, they are the most comprehensive and reliable Soviet I-O tables available to date and readily lend themselves to appropriate analytical studies. Furthermore, in the context of this present work, the issue is of much lesser concern. This paper examines the relative efficiency of various updating techniques when exogenous data is incorporated into the estimation process not the economic structure of the Soviet Union. Therefore, assuming the consistency of the two tables, even if they contain false or distorted data, analysis can be carried out and the results viewed as reliable.

Matrix Comparison and the Concept of Closeness

The essence of evaluating updating methods is in comparing the simulated and actual matrices, that is, determining which technique produces a matrix closer to the actual one, and how this closeness is measured. Is this a cell-by-cell comparison or general operational accuracy? Jensen [1980] terms these two kinds of accuracies as partitive and holistic and argues that while partitive accuracy is not achievable, a holistic accuracy test is sufficient for comparing matrices. Many measures of accuracy have been proposed to accomplish this task. Each method, however, suffers from a deficiency, and none are universally satisfactory. To overcome the shortcomings, a package of complementary accuracy tests is suggested in place of a single criterion (for example, Butterfield and Mules [1980]). Each criterion emphasizes a certain aspect of the comparison. Therefore, a carefully assembled package of statistical tests and accuracy measures will ensure, to