

Wiesław Juszcak

DESCRIPTION OF THE REMAINING PAPERS PRESENTED AT CONFERENCE

Econometric models of crises

Wojciech Charemza, Mirosław Gronicki (University of Gdańsk) - Rational Expectation in a Disequilibrium Model for Centrally Planned Economies: the Case of Poland.

In this paper a disequilibrium macro-econometric model for a centrally planned economy is considered. The subjective and rational expectations of the quantity transacted are simultaneously included into the set of informational variables. The rational expectations are used in three different ways:

a) as expectation factors in the households' utility function and consequently in the customers' demand for goods and money and supply of labour,

b) for constructing an adjustment equation with the labour demand and supply factors, which is a generalized form of the planned adjustment mechanism,

c) as an explanatory variable in the import demand equation, to describe the mechanism of anticipating the consumption excess demand by the foreign trade policy.

The paper consists of two main parts. In the second section of this paper the general framework of the model is given. In the third one the detailed specification is presented together with the results of respecification and estimation of the model of the Polish economy.

Jerzy Eysmont, Dorota Kalinin, Ryszard Kokoszczyński, Wojciech Maciejewski (University of Warsaw) - Modelling Crises of Centrally Planned Economies - the Case of Poland.

In the paper the authors present the basic assumptions of the model of crises in a centrally planned economy. According to the presented concept in a socialist economy three stages of a socio-economic crisis may be distinguished. For this purpose two notions have been introduced: lower turning point and upper turning point. A special emphasis has been put on the necessity of taking into account variables reflecting the socio-economic situation. Years 1956, 1970 and 1980 have been considered as crisis years.

Dorota Kalinin, Ryszard Kokoszożyński, Wojciech Otto (University of Warsaw) - Identification of Crises as a First Stage of the Crises Model Building.

In the paper, the authors present the empirical results concerning identification of crises in Poland in the period 1955-1980. A specific feature of the presented model is that it includes a dummy variable taking on value 1 for the years that were a priori assumed to be crisis years. The analysis of the dependence of this variable on other variables of the model was based on the discriminating analysis technique.

The proposed model contains three segments:

- a) a set of equations explaining endogenous variables of the model,
- b) a linear discriminating function,
- c) an endogenous dummy variable reflecting crises.

The obtained results have confirmed, to some extent, the a priori assumptions about the years 1956, 1970 and 1980 to be crisis years.

J. Jacek Sztaudynger (University of Łódź) - Industry Output Constraints.

In the presented paper the model of the Polish industry output:

$$X = f(N, K, M, RM),$$

where: X - output, N - employment, K - fixed assets, M - imports, RM - raw materials,

is considered. The author looks for the bottleneck for each year comparing one factor production functions. Next he specifies a non-typical production function:

$$\frac{X_t - X_{t-1}}{X_{t-1}} = f\left(\frac{Y_t^1 - Y_{t-1}^1}{Y_{t-1}^1}\right) \quad Y^1 = N, K, M \text{ or } RM,$$

where: Y_t^1 - bottleneck factor in period t , $t - 1$ - period prior to that in which Y^1 was a bottleneck, and calls it a bottleneck production function.

In the above discussed subject the following papers have been also presented at the conference (they are enclosed in the successive part of the fascicle):

Maria Lubera, Maria Potargowicz, Władysław Welfe (University of Łódź) - Multipliers Analysis Based on the W3S79 Model, Wiesław Juszcak, Władysław Welfe (University of Łódź) - Forecasts of the Polish Economy 1983-1985 Based on the W3S79 Model, Władysław Welfe (University of Łódź) - Model W-5 of the Polish Economy: General Assumptions and First Empirical Results.

Intercountry models

Anatoli Smyshlayev (Iliasa, Laxenburg), Estimation of Intercountry Structural Changes in Industrial Production.

The purpose of a comparative study of the economic structure between developed countries is to discover numerically the similarities in economic growth, i.e. to identify the main factors including great differences in their pattern of industrial production. This paper considers a set of interrelated indicators of the economic development and the production structure for six developed countries (USA, Great Britain, France, Federal Republic of Germany, Canada and Japan) during the period 1960-1977.

To realize the aims of the investigation the author utilized an aggregated econometric model consisting of about 20 equations and reflecting changes in gross output and energy inputs. In the study the industries have been divided into two groups. The first one includes those countries whose development is most associated with the growth and composition of final demand. The second consists of those whose growth is related mainly to other industries (through interindustry interaction process).

Preliminary results show that expanding of intercountry analysis to interindustry interaction modelling provides a consistent basis for a long-term forecasting when values of industry outputs are generated by the system of simultaneous equations.

Jurij Chyzhov (Academy of Sciences, USSR) - Dynamic Properties of a Macroeconomic System.

In the Siberian Branch of the Soviet Academy of Sciences a number of models of the developed capitalist countries have been built. They are nonlinear, quarterly models consisting of 20-60 equations, and are used to analyse cyclical fluctuations and to construct short term forecasts.

In the presented paper the author gives a detailed comparison of the US economy models constructed in the USA and in the Soviet Academy of Sciences.

The analysis of the ex-post forecasts shows that the models constructed in Novosibirsk properly describe a decided majority of turning points in the development of the American economy. The results of various comparisons show that the models built in Novosibirsk properly forecast the direction of changes in 85% (identical result was obtained only on the basis of the Wharton Model), and that only 54% of forecasts are too optimistic, compared with 61-63% of such results obtained from the models built in the USA.

Jan B. Gajda (University of Łódź) - The Crisis Response of the CMEA Economies.

The subject of the paper is the description of the simulation experiments of the impact of the perturbations in the world economy on the economic growth of the European CMEA countries.

Separate simulation scenarios reflected the results of changes in:

- world trade,
- - world trade prices,
- investment policies of the separate countries.

A special attention has been paid to restrictions connected with the new credits availability in the foreign trade and to the necessity of slowing down the increase in foreign indebtedness, especially in relation to Western countries.

In the discussed subject the followig paper has been also presented at the conference (enclosed in the successive part of the fascicle):

Jan B. Gajda, A. Bartłomiej Czyżewski, Ewa Górską-Haładaj, Grażyna Juszcak, Dorota Miszczyńska, Maria Potargowicz, J. Jacek Sztaynger, Paweł Tomczyk (University of Łódź) - Regional Model of CMEA Economies.

Input-output models

Gabrielle Antille, Daisy Gilli (University of Geneva) - Input-Output and Macroeconomic Analysis for Switzerland.

The existing macroeconomic models of the Swiss economy do not include input-output relations as the appropriate data were not available in the country. The authors of the paper have filled in this gap by building the input-output table for the year 1975. On the basis of the obtained relations, they analyzed the Swiss economy, more precisely - they presented the hierarchical analysis of production processes by branches and multipliers of production, employment and foreign trade.

In the second stage of the presented investigation, the authors attempted to incorporate the Swiss input-output matrix into the macroeconomic model developed by Gilli-Pilloud and Aprile. On the basis of the supplemented macroeconomic model the authors analyzed the impact of the private and public investment on the output structure and the impact of the various final demand categories on employment.

In the discussed subject the following papers have been also presented (they are enclosed in the successive part of the fascicle):

Czesław Lipiński, Lucja Tomaszewicz (University of Łódź) - Important Coefficients in the Input-Output Models for Poland.

Jan B. Gajda, Dorota Miszczyńska, Marek Miszczyński, Lucja Tomaszewicz, Jerzy S. Zieliński (University of Łódź) - Energy Limitations and Optimal Development of Polish Economy.

Estimation of large interdependent systems

Herman Wold (University of Uppsala and University of Geneva) - Predictive Modelling of Large Systems: the Fix-Point and Partial Least Squares Approaches.

In the presented paper Professor Wold described:

- historical development of the principles and methods of econometric modelling and their connections with those of multivariate statistical analysis (basically with such its fields as principal components, multiplier and regression analyses),
- the reformed interdependent system and the analysis of the predictive properties of the Fix-Point method,
- path modelling (coming from psychometrics and sociology) with latent variables and their estimation methods i.e. Joreskog's LISREL method based on the maximum likelihood (ML) and the partial least squares (PLS) methods.

Additionally the author analyzed the properties of ML and PLS methods and presented some empirical results of their applications in psychological, chemical and economic data analysis.

Jan B. Gajda (University of Łódź) - Estimation of Nonlinear Systems and Fix-Point Method.

The paper investigates a straightforward generalization in three leading cases: a system with nonlinear identities, a system with stochastic equations nonlinear in variables and a system with equations nonlinear both in variables and parameters.

It can be easily shown that iterative instrumental variables estimator is consistent in all three cases. The (proper) Fix-Point estimator consistency is discussed in connection with the discussion of reduced form vs. expected values expressions, compared with Edgerton's approach through Taylor's expansion.

Examples of the real world model (W4 model of the Polish economy) are being shown. Eventually further generalization towards dynamic Fix-Point methods (implicitly estimating the final form equations of an interdependent system) is shown.

Lennart Bodin (University College of Örebro) - Structural Insight and Computational Efficiency in Large Macroeconomic Models.

In the paper the author presents the advantages resulting from the analysis of the connections between variables of a large econometric model (as an example the author utilizes the W3/82 model of the Polish economy consisting of over 400 equations).

The author has proved that the analysis of connections and optimal reordering makes the iterative estimation and solving (simulations) much faster. In the case of block recursive models the analysis simplifies determination of the spectral radius of the model blocks and determination of such a relaxation coefficient which maximally accelerates iterative process.

Estimation of single equation models

Zdzisław Hellwig, Antoni Smoluk, Barbara Puzdrowska (Academy of Economics, Kraków) - Parameters Estimation of Linear Econometric Models under Scarce Information.

One of the most important obstacles in the econometric modelling is the lack of sufficient statistical data. The reason for this is, among others, the necessity of shortening statistical time series due to significant instationarity of economic processes. As a result of this the estimation of the econometric model parameters is based on 10-12 observations what makes it impossible to introduce into a model a larger number of explanatory variables if one wishes to apply classical estimation methods.

In the paper the authors present several possibilities of the parameters estimation in the case when the number of parameters exceeds the number of observations. All the proposed methods deliver biased estimators. However, there exists a possibility of reducing this bias to insignificantly low level, so that it may be ignored, compared with relatively high standard errors of the estimates resulting from small sample size.

All the proposed methods delivering "good" estimates have been named "licenced least squares methods".

Władysław Milo, Zbigniew Wasilewski (University of Łódź) - Robust Estimation Methods: a Comparative Analysis.

The existence of outliers in sample data and their influence on the least squares estimator and the fitted line implies the need of a careful examination of the so called bad data points. In the paper, the authors try to analyse the influence of gross errors in the data on such characteristics of the estimator and ex-post predictor as bias, variance, MSE, correlation between explained variable and its ex-post predictor, the ratio of the absolute sum of residuals to the absolute sum of the sample data and its structure. On the basis of these characteristics a comparison of the LS estimator with the chosen 6 robust estimators is made. The residual plots are included in order to show their strong dependence on a contamination of the sample.

Izabella Kudrycka (Central Statistical Office, Warsaw) - Selecting of Explanatory Variables Based on the Similarity Measures.

The problem of selecting explanatory variables to an econometric model is one of the basic problems of the econometric theory and its applications. The methods of selecting variables proposed in the econometric literature are usually based on the principal components method or on the step-wise regression. The idea of the method presented in the paper rises from the H.Theil's information theory developed in 1967.

The problem of selecting variables to an econometric model has been treated as a selection of those variables the relative changes of which are similar. The author defines measures of variables' similarity being the basis of their selection. A characteristic feature of the proposed method is that the similarity measure is a transformation of a conditional entropy and hence it can be clearly interpreted.

Jan Zawadzki (Technical University of Szczecin) - Prediction Variances of Econometric Models for Time Data.

In the paper a comparison of the prediction variances of two causally-descriptive predictors (both with and without time variable t) and trend predictor is presented. This comparison is an essential problem from the point of view of equation choice with the best predictive properties. The minimization of a random

component variance estimation is generally a common feature for the majority of the choice methods.

It is univocal with a silent assumption that the predictor, being characterized by a minimal residual variance, has the lowest prediction variance. The mentioned assumption is not always fulfilled because the prediction variance depends also on both explanatory variables values and covariance parameters estimators.

In the paper, an examination of the effect of explanatory variables values changes of the causally-descriptive predictors on the prediction variance value has been performed.

Andrzej S. Tomaszewicz (University of Łódź), Abdul M. H. Al-Nasir (University of Baghdad) - Some Problems Concerning Time-Series Models with Time-Dependent Parameters.

A previous work on the statistical inference in time-series models by statistics has mostly assumed that the parameters are fixed. This assumption is quite unrealistic in practical situations and the present paper is intended to tackle the problem of estimation of the time-series models with time dependent parameters.

A first order autoregressive time series-model $Z_t = \phi(t) + a_t$ is considered, because it is believed that this model may describe a great number of practical situations and a numerical comparison is made on T. S. Rao (1970) method of estimation and other alternative methods where some new results are obtained.

In the discussed subject the following papers have been also presented at the conference (they are enclosed in the successive part of the fascicle):

Abdul M. H. Al-Nasir (University of Baghdad), Andrzej Tomaszewicz (University of Łódź) - On the Estimation in a Simple Linear Regression Model with Low Order Autoregressive Moving Average (ARMA).

Iwona Konarzewska, Władysław Milo (University of Łódź) - Some Notes on Applicability of Variance Decomposition Method.

Multicollinearity in econometric models

Reinhold Bergstrom (University of Uppsala) - Estimation of Macroeconometric Model of Sweden by Ridge Type Methods.

In the paper, the author presents the outline of construction and specification of the stochastic equations of macroeconomic model of Sweden and their analysis from the point of view of multicollinearity measured by the coefficients of multiple correlation between explanatory variables. The idea of the ridge estimation method is shortly presented. The author discusses results of the comprehensive analysis of the ridge type methods and the least square method exemplified by the presented model - the analysis being based on the standard errors of the ex-post prediction. Additionally, the results of application of the ridge version of the fixed-point method based on the least squares method are presented. The author noticed, among others, a faster convergence of the last mentioned method. In the paper the author presents also the results of the analysis of short- and long-run multipliers calculated on the basis of chosen ridge type methods.

Leszek Jasiński (Institute of Home Trade and Services, Warsaw), Elimination of Near Extreme Multicollinearity by Variables Orthogonalisation.

Explanatory variables of a one-equation econometric model would be called to be multicollinear exact to ϵ , if there exist numbers, not all equal to zero, such that the norm of a linear combination of these variables with these numbers being its coefficients is smaller than ϵ .

The author of the paper presents the description of an algorithm allowing to eliminate the variable which is nearly multicollinear in the process of estimation (classical least squares), in such a way that it is possible to obtain the parameters estimates of the model with reduced number of variables without reestimation. The algorithm is based on the modified Gram-Schmidt orthogonalization method.

Józef Hozer, Jan Zawadzki (Technical University of Szczecin) - The Collinearity of Explanatory Variables in the Econometric Models for Time Data.

From a variety of techniques for measuring a degree of collinearity the authors employ for the research purposes the formula which was put forward by B. Schips and W. Steir:

$$\lambda = R^2 - \sum_1 r_1^2,$$

where: R - coefficient of multiple correlation, r_1 - correlation coefficients between Y_t and X_{1t} .

The authors showed that to prevent negative effects of collinearity it is necessary to estimate the parameters on the basis of deviations from trends, or to introduce the time variable t to the set of explanatory variables.

Oleg V. Starovierov (Central Institute of Mathematical and Economic Research, Moscow) - On a Correlation Test.

In the paper the author presents a test verifying the hypothesis:

$$H_0 : \mathbf{x}_1 : N(\mathbf{a}, \delta^2 \mathbf{I}),$$

against the alternative hypothesis

$$H_n : \mathbf{x}_1 : N(\mathbf{a}, (\delta^2 \mathbf{I} + h\mathbf{E}))$$

where: $i = 1, 2, \dots, n$, \mathbf{x}_1 - k -dimensional random vectors, \mathbf{a} - k -dimensional vector of constants, δ^2 , h - constant real scalars (unknown).

In the case when $n < k$ the procedure of verification is well known and is based on the Wishart's distribution. The author considers the case when $n > k$, i.e. when the estimated covariance matrix is degenerated. The statistics of the presented test is proved to be of noncentral Fisher's distribution. The test is uniformly most powerful and unbiased. The considerations are exemplified by the verification of the hypothesis of independence of death rates for various age groups.

In the discussed subject, the following paper has been also presented at the conference (it is enclosed in the successive part of the fascicle):

Czesław Domański, Andrzej Tomaszewicz (University of Łódź) - Power of the Test Based on Number of Runs in the Case of Second Order Autocorrelation Process.

Miscellanea of applied econometrics

Alain Bonnafeous, Michel Violland (University of Lyon II) - Principal Components Method in Transport Econometrics.

Forecasting goods transportation activity in a long term is relatively easy. Indeed, the relation between goods transportation and economic activity is obvious. Therefore, the use of such variables as: industrial output, foreign trade and so on, gives good results in medium- or long term models.

It is quite different if the object of the model is a short term forecast. Mainly because the fluctuation factors in goods transportation activity are not very well known. As the analysis in principal components gives help in discovering causal connections, it is particularly well designed for this kind of research. Applied to the great number of quarterly observed variables (transportation, consumption, investment, stocks, activity) it has shown a close connection between the transportation fluctuations and evaluation of stocks which express an economic turn-around.

Moreover, the integration of stocks in a short term forecast model based on the analysis of principal components, has permitted an improvement in a forecast macromodel building.

Kazimierz Krauze (University of Gdańsk) - On the Specification and Estimation of Dynamic Macroequation System.

The author distinguishes different types of macroequation systems (from the point of view of the degree of similarity between the given macrotheory and the underlying microtheory) and their different forms (based on the micro-system). The author tries to find the best specification of the model. These problems are discussed on the basis of a dynamic specification.

Using the results of a Monte-Carlo experiment the author evaluates ordinary least squares (OLS), two-stage least squares (2SLS) and instrumental variables (IV) estimators applied in different specifications of a dynamic two-macroequation system which describes the average wages and the working capacity of workers of industry and development group in the Polish socialized industry. The hierarchy of all these applications is also qualified.

Jolanta Sala, Krystyna Strzała (University of Gdańsk) - Computer Aided Optimal Control System.

A control of economic system behaviour requires the knowledge both of its mechanism and the applicable indices of control quality. The system mechanism can be described by a simultaneous equation dynamic econometric model.

In the paper a concept of optimum control model with a simultaneous equation econometric model being its submodel are presented.

The starting point of investigations constitutes a state-variable form of an econometric model. The loss function of the optimal control model is constructed in such a way as to minimize the differences between desired and actual values of state and control variables. The simultaneous equation econometric model in a state-variable form is used as a constraint during the process of minimization of the loss function. To solve the optimal control problem the authors use an algorithm based on the Discrete Minimum Principle proposed by R. S. Pindyck.

In the last part of the paper the authors present the empirical results based on real data for building an industrial enterprise.

Pavel Katyshev (Central Statistical-Economic Institute, Moscow) - Stochastic Equilibrium Model.

The author presents a concept of dynamic equilibrium model. One of its original elements is introduction of stochastic parameters. A convergency of the presented model depends on the assumed distribution of the stochastic variables. The most general outcome of the paper is a proposition of assuming symmetric distributions.

In the discussed subject the following paper has been also presented at the conference (it is enclosed in the successive part of the fascicle):

Krzysztof Markowski (University of Łódź) - Impact of Plan on Capacity Utilization.